December 23, 1957

Paper Trade Journal

BLEACHING CHIP MECHANICAL PULP

A study of bleaching methods for use with this new pulping process—groundwood from hardwood chips.

CANADIAN PACIFIC MILL MOVES

Sidney Roofing relocates existing facilities, installs new cylinder board machine.

APPLICATIONS FOR POLYVINYL ALCOHOL

What type to use and where to use it.

GRINDER CONTROL FOR GROUNDWOOD

Survey of methods practiced for grinder control.

NSSC EVAPORATION

The Swenson forced circulation triple effect evaporator at Watervliet Paper Company, Watervliet, Michigan, concentrates recovered solids from the production of 50 tons per day of NSSC pulp. The design embodies features necessary to avoid the scale ordinarily encountered with these liquors. Swenson has both forced circulation and natural circulation evaporator systems concentrating NSSC liquors and combinations of NSSC and Kraft liquors.

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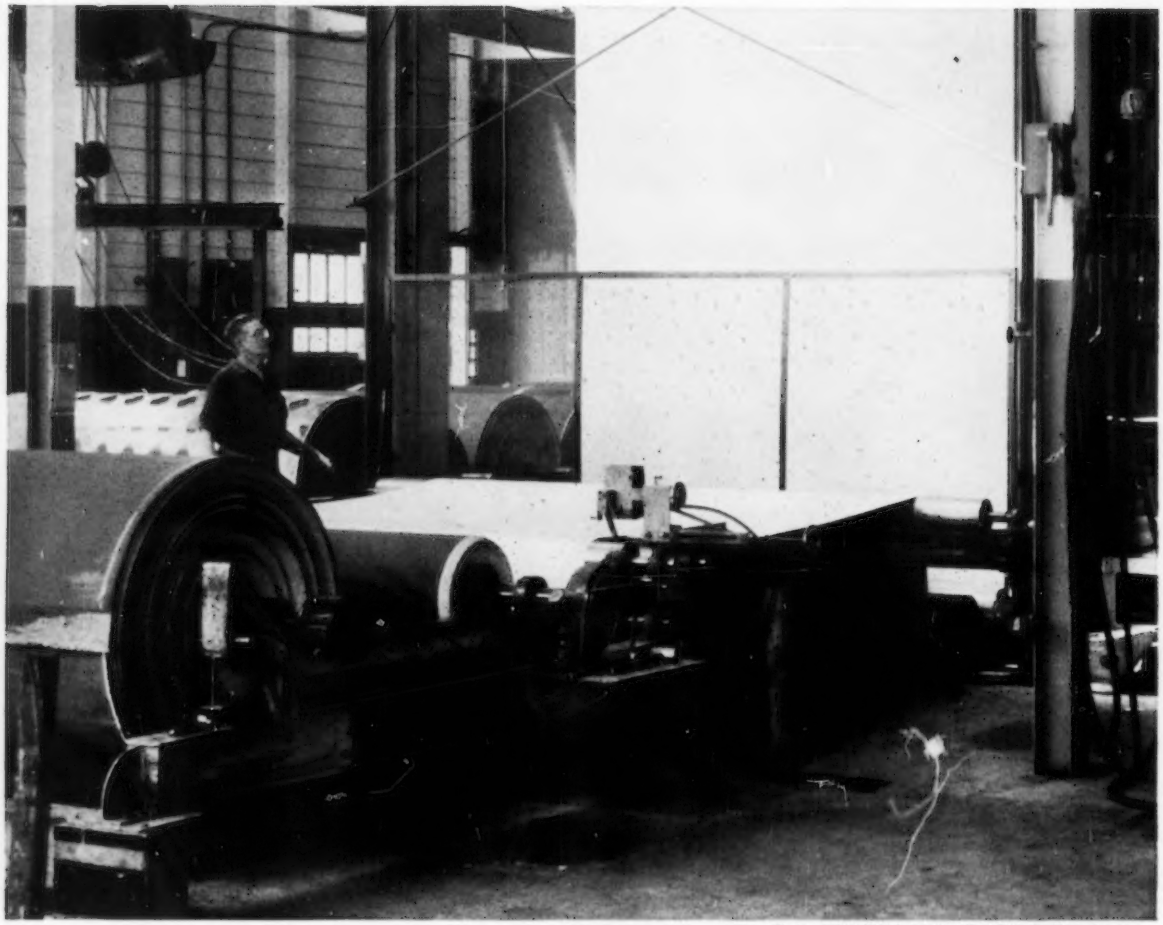

Photo courtesy Bird & Son, Inc., East Walpole, Massachusetts

It prints a new pattern of profit

A new way of printing patterns has resulted in a new low-cost, printed flooring—featuring high gloss, smoothness, striking detail and depth of color, with good wearing properties.

A nine-foot offset rotogravure press is used by Bird & Son, inc., to print the highly decorative, multi-color patterns in great detail. The only one of its kind, this press turns out patterns nearly 100 times sharper than those obtained with the usual flat bedblock print ordinarily used on felt base.

Key to the successful reproduction of these patterns is a white printing base coat made with PLIOLITE LATEX. This highly pigmented film prevents the asphalt base from bleeding through and presents an adhesive surface for good printing with good binding of the vinyl topcoat. PLIOLITE LATEX is used because of its excellent uniformity, compatibility and stability.

Undercoats are but one of many uses for PLIOLITE LATEX and related latices. Learn more about how they can help you to new products and profits by writing for details plus the latest *Tech Book Bulletins* to:
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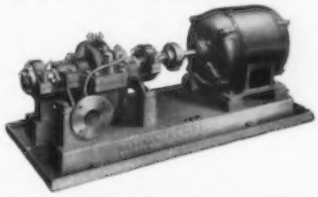
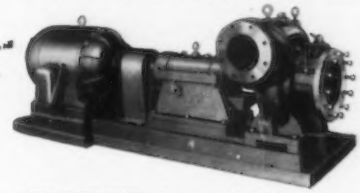
CLEAR WATER—For clear water service there is no more efficient pump than the double-suction "Buffalo" Type "SL". Its hydraulic balance, its free-flow water passages and husky construction mean economical service over many years. Capacities from 10 to 14,000 gpm. Write for Bulletin 955.



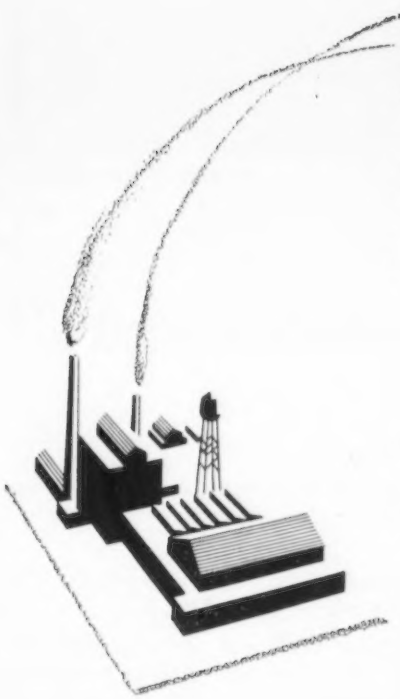
HIGH PRESSURE – "Buffalo" Type "RR" Multi-stage Pumps combine rugged strength and efficiency on boiler feed and other clear water service, against heads as high as 1500 feet, in capacities up to 900 gpm. Shafts are extra-heavy with ball bearing support on both ends — stuffing boxes are deep. Write for Bulletin 980 for all engineering details.



NON-CLOGGING – For moving high-consistency liquids, "Buffalo" Diagonally Split-Shell Pumps offer freedom from expensive shutdowns. And since efficiency does not depend on close impeller clearances, there is no problem of "wedging" and wear. Available rubber-lined for corrosive or abrasive liquids. Write for Bulletin 953.

HEAT TRANSFER – "Buffalo" Heat Transfer Pumps are specifically designed for high-temperature liquids. Successfully used in large installations, they employ special water-cooled bearings and packing, plus suitable alloys — built into our basic, efficient single-suction, solid shell design. Write for engineering details.

CHEMICAL LIQUIDS – "Buffalo" builds 10 special types of chemical pumps in a wide choice of trim for almost any corrosive, abrasive or high-consistency liquid. Above is a single-suction, full ball bearing model. Write for Bulletin 982 and check this wide selection.



Because "Buffalo" builds a *complete* line of pumps tailored to the liquid-moving applications of every industry, you get all the benefits of a custom-designed pump — without paying a "custom" price. You can match a "Buffalo" Pump to your exact conditions — and enjoy the high efficiency, easy maintenance and long life that only such a pump can deliver. Shown here are some of the types — simply write us about your problem, and we'll recommend the *right* pump!

ALSO . . . *"Buffalo" Close-Coupled Pumps, Sump Pumps, and Raw Sewage Pumps — all with the "Q" Factor, or built-in Quality which provides trouble-free satisfaction and long life in every "Buffalo" product.*

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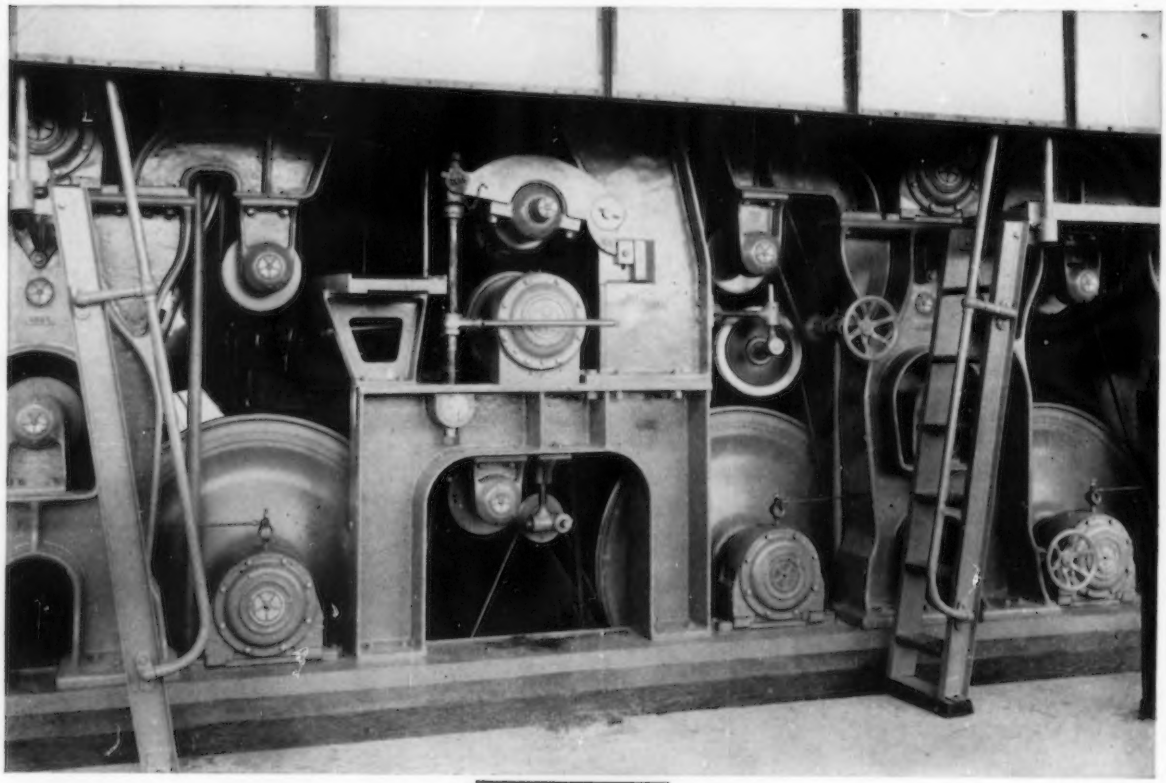

5

Here's where Texaco's five-way protection pays off

Paper machines are big capital investments. Prevent costly down-time and repairs—keep them running smoothly and safely—with *Texaco Paper Machine Oil HD*. It's the lubricant that gives you five important advantages:

1 **It Gives Full Protection**—Dependable lubrication for heavily loaded roller bearings, even at temperatures of 300°F. or more.

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REMEMBER THESE DATES . . .

JAN. 23: Western Michigan University's Annual Pulp & Paper Conference, Kalamazoo, Mich.

JAN. 29-31: Canadian Pulp & Paper Assn. Annual Meeting at Mount Royal Hotel, Montreal, Canada.

FEB. 17-22: Paper Week in New York.

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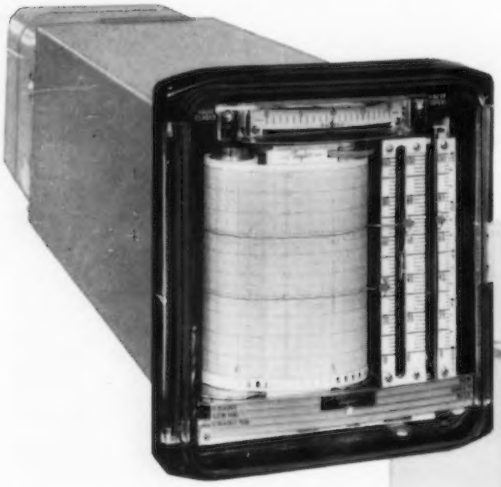
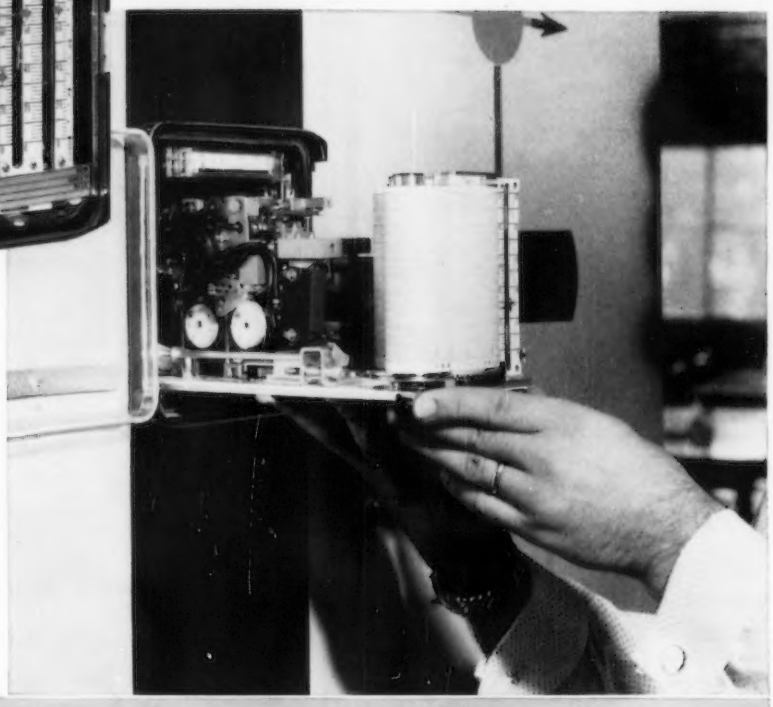
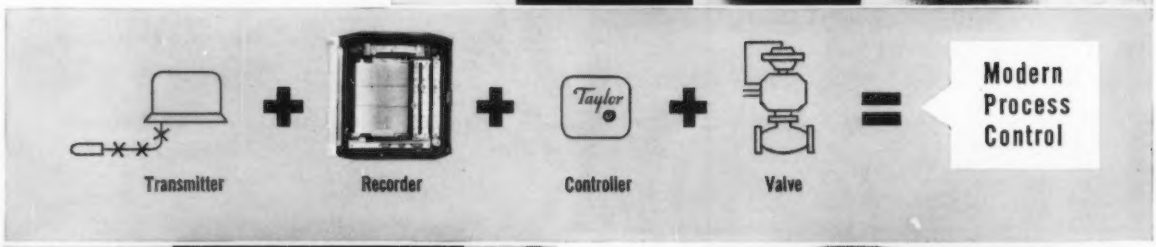
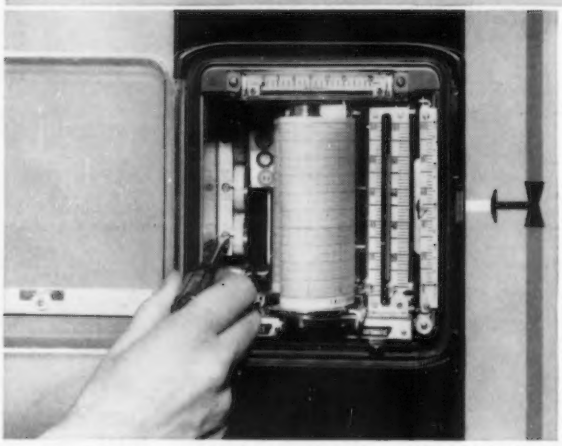




Unique new Taylor TRANSCOPE Recorder plugs into panel-mounted manifold—an integral part of the sleeve. Model shown is the 2 pen recorder with continuous set point, automatic-to-manual switch and output pressure indicator. "Servomatic" power pens provide 150 times more power than conventional bellows-actuated type, assuring life long accuracy.





Controller settings are made from the front while recording. Gain, reset and PRE-ACT® dials are calibrated in specific units. Eliminates blind adjustments—settings and results are seen in one spot . . . the front of the panel.

Most dependable chart drive. Chart is held in positive position and driven by rectangular pins. Timing control is absolute, because chart drum is driven by a Gilmer, chain-like belt. No jerking, because new Rulon bearings cut power needs in half. 4", 30-day chart gives 3 hour visible record.

. . . so Many Features in so Little Panel Space!

Taylor's new 90J Series TRANSCOPE* Recorder is a giant step forward in the development of convenience and compactness for modern instrument panels. No other recorder, regardless of size, puts so many features in so little panel space.

• **Front-of-Panel Control Settings** let you make adjustments easier, quicker, and better . . . from the front of the panel . . . while recording! You can clearly see what you are doing, and the results, because the record is continuous.

• **Stays on Automatic Control** while the recorder is removed for inspection. The unique Set Point Transmitter remains plugged in the case, providing continuous fully automatic control.

• **Complete Indicating Control Station** while recorder is removed. You see the variable. There's no need to shut down the process for instrument service or adjustments. Horizontal gage at top of recorder will show either process variable or air output to valve, as desired.

• **More Accurate Records.** Responsiveness to transmitter output is 0.1%; and because of the very small pneumatic displacement of the input capsule, the response is practically instantaneous. You see more minute process changes, so you can make optimum control setting. SERVOMATIC power pens assure accurate pen position.

• **Interchangeable Components** — all major assemblies, components and unit parts are completely interchangeable. Both the TRANSCOPE Recorder and Controller may be changed in the field from simplest to most complete form.

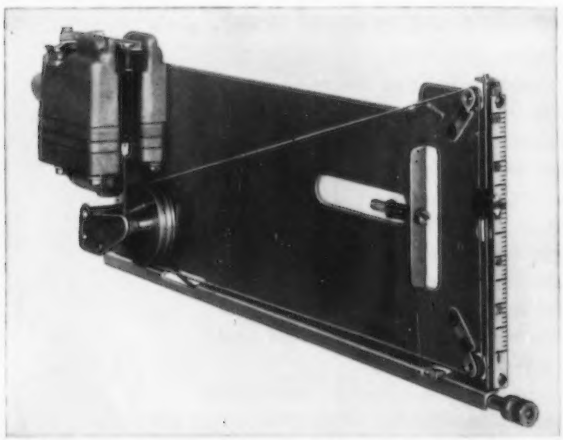
• **Receives Three Variables** to be recorded or indicated; has a set point transmitter, an automatic-to-manual switching lever, a cascade or process-output indicator, and many other features . . . all in a compact case.

• **Complete Cascade System** — a complete master-slave combination, in a smaller case than ever before. Perfect for direct control of composition, as well as the usual cascade control applications.

For further information about this revolutionary new recorder, see your Taylor Field Engineer, or write for **Form No. 98282.** Taylor Instrument Companies, Rochester, N. Y., or Toronto, Ontario.

Instruments for indicating, recording and controlling temperature, pressure, flow, liquid level, speed, density, load and humidity.

*Trade-Mark



Exclusive "Set Point Transmitter" allows continuous automatic control during recorder removal. The plug-in transmitter assembly may be removed and the control valve sealed in operating position. No need for process down time for instrument inspection or servicing.

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Every square inch . . . every surface fiber of the paper web shown must come in contact with this rubber covered roll. This roll, so critical in its use and manufacture, must be firm enough to extract the maximum amount of water from the web. It must be so gentle that it will not crush paper, or injure the felt; so smooth that it will impart its fine finish to the paper; and so carefully compounded chemically and from the standpoint of density and surface that it will press and release the sheet quickly and cleanly, without sticking or picking. No wonder the large majority of America's leading mills will settle for nothing less than the best rubber covered rolls from Stowe-Woodward, Inc.

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STOWE-WOODWARD, Inc.
Craftsmen in rubber
RUBBER ROLLS with a REPUTATION

Paper and Board Start December Off

Paper and board production both failed to rebound after Thanksgiving week. As reported in Figures of the Week (page 18), the paper production ratio for the first week of December was 88.7% and board was 84%.

Paper To Score Moderate Gains

Now that paper consumers appear to have liquidated their excessive inventories, the paper industry can expect a moderate gain in sales, says The Value Line Investment Survey published by Arnold Bernhard & Co. Growth in final consumption per capita should enlarge the industry's market, despite recessive tendencies in other parts of the economy, states the survey.

Westinghouse Prexy Optimistic

"Although most economists have predicted a slight decline in industrial production, particularly in the first half of 1958, nevertheless, it appears that total output of goods and services will show a slight increase over this year's record," states Gwilym A. Price, Westinghouse president, in his annual year-end statement. In the past Mr. Price's forecasts have been quite accurate and we hope that his predictions, as well as the one quoted in the item above, are correct, although they tend to go counter to the general run of prognostications now being issued.

First Quarter Pulp Prices

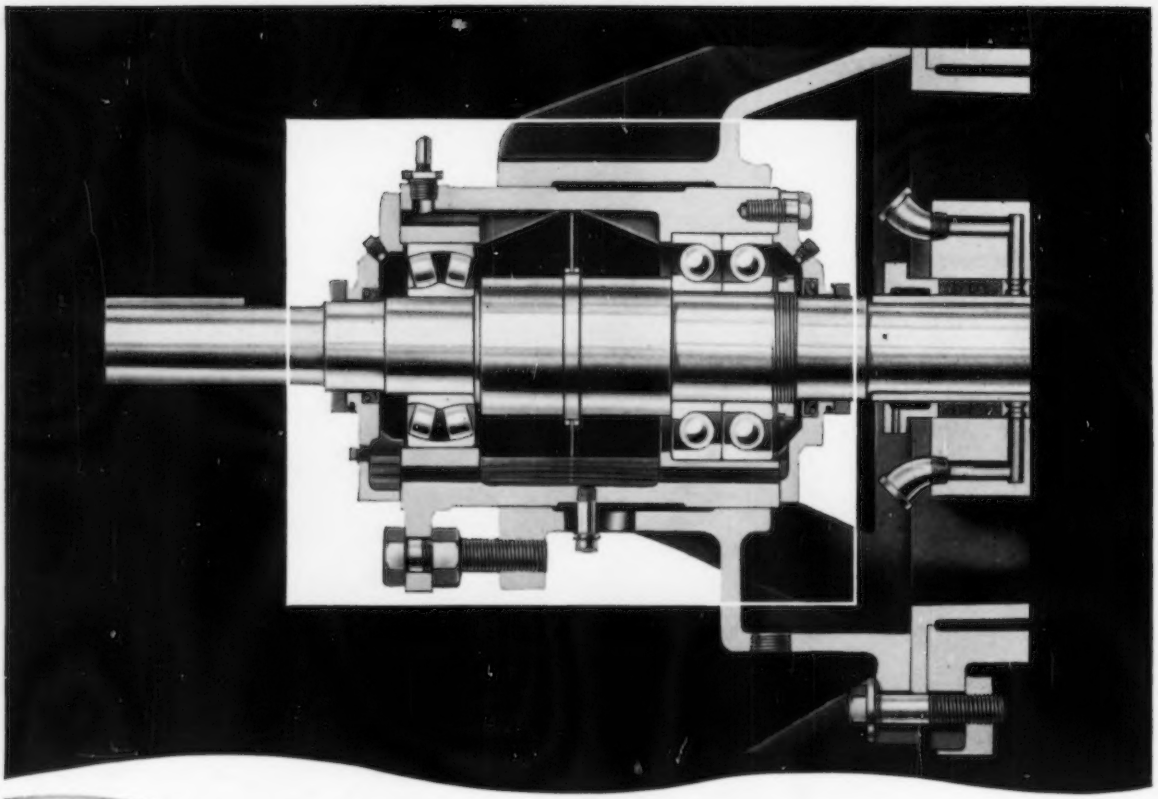
It now appears that there will be no change in basic pulp prices for the first quarter. There will be some minor grade adjustments and more European producers may quote on a fully delivered basis.

Pulp Imports

Pulp imports from Canada for the first nine months, compared with the same period last year show the following: Total —6%, bleached kraft +5%, semi-bleached kraft +29%, unbleached kraft +29%, bleached sulphite (paper) —4%, bleached sulphite (chemical) —29%, unbleached sulphite —24%, bleached groundwood —39%, unbleached groundwood —11% and soda —11%. Pulp imports from Europe for the first three quarters of the year show: Total —34%, bleached kraft —31%, semi-bleached kraft —14%, unbleached kraft —42%, bleached sulphite —17%, unbleached sulphite 39%, and unbleached groundwood —57%. To sum up—all paper grades of Canadian kraft were up, all others down. No important European grade showed an increase. European shipments were off percentagewise much more than Canadian.

Bleaching Groundwood from Chips

The new process for manufacture of groundwood pulp from chips, first announced in this magazine less than two years ago, has as we predicted made remarkable progress. Now we are privileged to publish in this issue, the first authoritative article on bleaching this new pulp. We hope that by making this information widely available to further speed the use of groundwood from chips.



Maximum parts interchangeability with

NEW bearing bracket

Ten PW pump sizes for either direct or *Texrope* drive—for open or enclosed impeller.

Renewable high efficiency, quick conversion from oil to grease lubrication and maximum parts interchangeability are three outstanding features of Type PW paper stock pumps with the new bearing bracket.

Just *3* bearing bracket groups cover all *10* pump sizes, simplifying maintenance and parts ordering. Cartridge type frame liner simplifies clearance adjustments between impeller and side plate. This eliminates efficiency loss which usually results from recirculation as these surfaces wear. A visual, constant-level oiler assures proper lubrication. Grease fittings can be easily inserted if desired.

The new bearing bracket is standard on all Type PW paper stock pumps. For more information, contact your A-C office, or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

Texrope is an Allis-Chalmers trademark.

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A-5551

IMPORTANT TIP FROM DU PONT—

When you bleach chip mechanical pulp produced from hardwoods...

A PEROXIDE-HYDROSULFITE BLEACHING PROCESS WILL GIVE YOU

BRIGHTER AND WHITER PULP

Without the excessive yellow color usually characteristic of pulps that are bleached with hypochlorite, resulting in—

LOWER PAPER COSTS

The use of high brightness groundwood-type pulp in the furnish often permits a saving in the bleached chemical pulp requirement and gives—

SOFTER, BETTER PRINTABLE PAPER

Increased use of this high brightness pulp in paper manufacture means greater opacity and better printing qualities.

We will be glad to discuss this combination process with you. Just drop a line to the address below.

NOTE: Du Pont Hydrosulfite Conc. is a product of Du Pont's Organic Chemicals Department.

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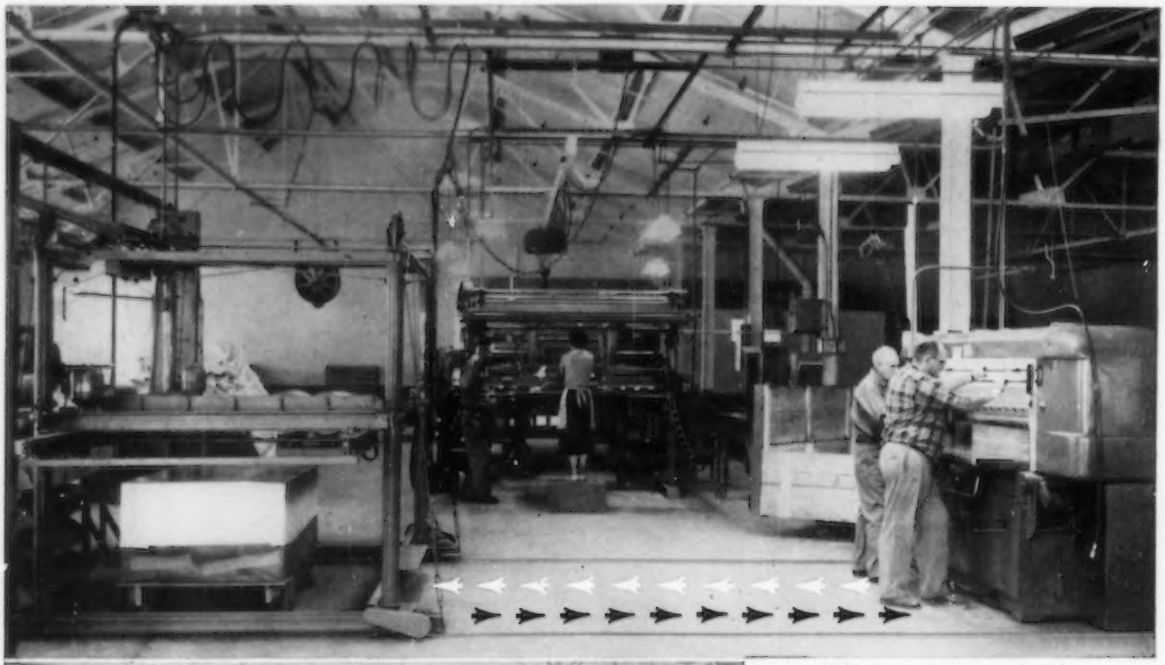
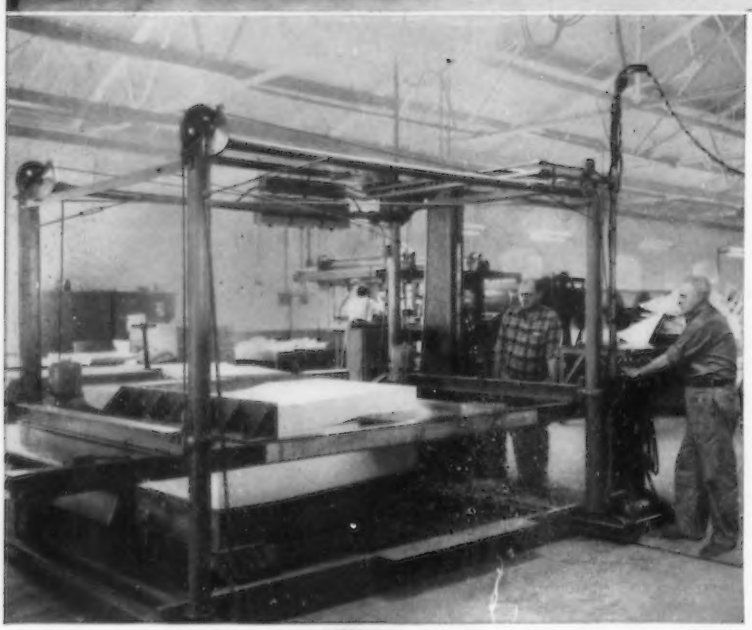


Photos courtesy of Kalamazoo Paper Co.



Mechanize Your Finishing Room with a Rice Barton Precision Sheet Piler*!

Developed by actual mill experience, the Rice Barton Precision Sheet Piler* gives you perfectly piled skids, doubles trimming and piling production without additional personnel, and eliminates the usual back-breaking effort.

Model 80 (shown) used in conjunction with an 85" trimmer piles a maximum sheet size of 79" x 55" to a height of 82" from the floor. Your Rice Barton representative can give you full details, or write direct to Rice Barton.

* Patents applied for.

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Worcester, Massachusetts

Paper Machine Builders Since 1837

West Coast Distributor: **Ray Smythe . . .** 511 Park Building • Portland, Oregon

N-E Lets Contract for Potsdam Mill Construction

A contract has been awarded to the John W. Rouse Construction Corp., Gouverneur, N. Y., for construction of a bleach plant, a machine room addition and installation of a paper machine at the Potsdam, N. Y., mill of Nekoosa-Edwards Paper Co.

Preliminary construction work began this week on the bleach plant building, a four-story structure 26 ft. wide and 68 ft. long. It will house a single-stage, hypochlorite, continuous- bleaching facility with a daily capacity of 35 tons. The installation is designed for eventual expansion to a 100-ton, three-stage bleach plant. Bleach liquor-making facilities are included.

The 75-ft. high structure will be of steel and reinforced concrete, with brick exterior except for the upper 35 ft., which will be of corrugated transite. The building will be erected within the existing sulphite mill. The bleach plant is expected to be in operation by spring.

The contract also covers construction of a 23 by 176 ft. annex to the paper machine room. This one-story and basement building will house a paper machine which will be transferred from the company's Nekoosa, Wis., mill.

Dismantling and removal of the machine will be accomplished shortly after the first of the year.

The new construction combined with installation of filtration facilities for process water and other mill improvements will cost in excess of $500,000.

K-C Offering Coated Cover Stock

Prentice Coated Cover, the first coated cover stock ever offered by Kimberly-Clark Corp., will be introduced in January.

Available in cover weights of 60, 80 and 100 pounds in a variety of sizes, Prentice Coated Cover is designed to match Prentice Offset Enamel.

Name Change for Keith Mill

The former Keith Paper Mill, Turners Falls, Mass., has gotten a new name: Strathmore, Turners Falls Division. Strathmore purchased the mill in 1953 and it was merged in 1956, but until recently it bore its old name.

Season's Greetings

to our Subscribers and Advertisers

from

Paper Trade Journal's

Editorial and Advertising Departments

Powell River Names Mead Sales Agent

Mead Pulp Sales Inc. of New York, Chicago and Dayton, have been appointed sales agents in the United States for Powell River unbleached sulphite pulp. The announcement was made in Vancouver by Powell River Sales Co. Ltd.

Paper and Board Production

According to the American Paper and Pulp Assn., the ratio of the United States production to mill capacity for the week ending December 7, 1957, was 88.7 per cent compared with 86.0 per cent revised for the preceding week. The ratio was 99.3 per cent for the corresponding week a year ago. Mills producing newsprint exclusively are not included.

The paperboard production ratio for the week ending December 7, 1957, was 84 per cent, compared with 86 per cent for the preceding week and 95 per cent for the corresponding week last year.

(Detailed statistics on page 18.)

K-C to Manage Irving Mill and Sales

In connection with the recent acquisition of a 35 per cent interest in the Irving Pulp & Paper Co. in St. John, N. B., by Kimberly Clark Corp., K-C has taken over management of the mill and sales of the pulp. J. C. Wig, formerly mill manager for K-C at Terrace Bay, Ont. is now in charge of operations at St. John and K. A. Craig of K-C's head office at Neenah, Wis., is general superintendent of the plant.

Northwestern Supts. to Meet at Stevens Point

The Northwestern Division of the Superintendents Assn., will hold its first 1958 Regional Meeting January 30 at the Whiting Hotel, Stevens Point, Wis.

Present plans for the meeting call for at least two mill visits during the afternoon and a dinner meeting with a special program for the evening.

No Integration Plans for Lily Tulip

Lily-Tulip Cup Corp. said it has no plans to go along with the present trend toward integration in the paper industry and build mills to make its paper and board requirements.

"For the foreseeable future," Walter J. Bergman, chairman, said, "we'll be as well off to buy our paper and board as if we had our own mills."

NEWS OF CONVERTERS

Bliss Green, Container Corp. of America (center), and Leonard Bodin, Pacific Fruit and Produce Co. (right), inspect sweet potatoes packed in the new washable corrugated shipping container as a workman removes them from the washing machine at Pacific Fruit's Atwater, Calif., plant.

Washable Corrugated Box Developed

A new washable corrugated shipping container for sweet potatoes and yams is now being used by California shippers.

Engineered and produced at Container Corp. of America's Oakland, Calif. plant, the new container was developed at the request of Pacific Fruit and Produce Co. to enable them to meet a rising demand from customers for washed produce and still retain the advantages of shipping their produce in telescoping corrugated containers.

Container Corp.'s packaging engineers designed a special vented bottom unit made from the water repellent V3C board developed for the U. S. Navy during World War II. After several carloads of these V3C board containers had been successfully tested, they began experimenting to find a less expensive container material which would stand up as well under washing as the V3C board.

After experimenting with several types of board they developed a container made of a heavy duty paper combination, similar to that used in heavy duty lettuce boxes, with wax dipped bottom flaps. This container proved to be even more satisfactory and considerably less expensive than the V3C board container.

The new container has horizontal, rather than the standard vertical, corrugations, to prevent water from seeping into the container and collecting at the bottom. A three-quarter-inch by six-inch vent in the bottom flaps plus holes in the corners permit water to drain freely from the container.

The new waterproof bottom-unit is interchangeable with the standard 40-pound net, telescoping, half-slotted shipping container used by sweet potato and yam shippers, enabling shippers to use a single standard top unit for both washed and unwashed shipments.

The new container permits growers to pack their produce in the field, wash it in the container on a standard open-mesh conveyor belt and ship it to market without removing it from the container.

Prior to the development of the new washable corrugated container, it was necessary to ship washed produce in wooden containers in order to avoid expensive repacking.

Natl. Fiber Moves to New Locations

National Fiber & Cushioning Co., Little Rock, Ark., converters of industrial cellulose wadding, has opened a 90,000 sq. ft. plant at Rockingham, N. C. and a 25,000 sq. ft. plant at San Dimas, Calif. Headquarters for the organization will be moved from Little Rock to Rockingham, N. C.

E. W. Heelas, head of the organization, will move to Rockingham. Ray Bechard, formerly at the Little Rock plant, will be general manager in charge of the California operation.

National Fiber has announced they will handle the Celotex Corp. industrial board fabricating for the southeastern states.

Taylor Fibre Moves New England Office

Taylor Fibre Co. has moved its New England branch office from West Newton, a suburb of Boston, to 967 Farmington Ave., West Hartford, Conn. The telephone number is Adams 6-3278.

Charles R. Whitehorne is district manager and James J. Ratchford, Robert H. McEvoy and Charles C. Currier Jr. are sales engineers for the New England territory.

Baltimore Firm Elects Sec.-Tr.

George C. O'Connell has been elected secretary and treasurer of Baltimore Business Forms Co. He previously served as controller of a printing machine manufacturing company, and as controller and credit manager of a wholesale hardware firm. He joined the Baltimore Business Forms Co. in 1952.

Canadian Folding Cartons Officers

Canadian Folding Cartons Ltd. has appointed G. C. Snell president and general manager. Mr. Snell is also a director of Somerville Ltd.

E. J. Dewhurst has been appointed vice president in charge of production and a director of Canadian Folding Cartons.

Elected Director of Paperboard Assn.

Leo H. Schoenhofen, senior vice president, Container Corp. of America, Chicago, has been elected a director of National Paperboard Assn.

Mr. Schoenhofen joined Container Corp. in 1940 as assistant to the executive vice president; since that period he has moved upward in the company, being promoted to senior vice president in March 1954. He is a director of the Folding Paper Box Assn.

PRICES OF FIBERS

MARKET WOOD PULP

FOURTH QUARTER CONTRACT PRICES PER SHORT AIR-DRY TON

Delivered Basis

	U.S.	Canadian	Swedish	Finnish	Norwegian
Groundwood	$82.50/ 90.00	$82.50/ 90.00	§$90.00/ —	§$90.00/ —	§$90.00/ —
Bleached Gw'd.	$97.50/100.00	$97.50/100.00			
Kraft, Blchd.	157.00/ —	160.00/162.50	$157.00/162.50*		$157.50/ —
Kraft, Blchd. Hdwd.	152.00/ —		§137.00/ —		
Kraft, Semi-bleached	140.00/ —	140.00/ —			
Kraft, Unbl.	117.50/125.00	125.00/130.00	†125.00/130.00	125.00/ —	
Sulphite, Blchd.	155.00/ —	155.00/ —	*155.00/ —	*155.00/ —	155.00 —
Sulphite Bl. Hdwd.	150.00/ —				
Sulphite, Unblchd.	135.00/ —	135.00/ —	†135.00/ —	*130.00/ —	
Sulphite, Unb'l. Gl'sn		134.00/ —	†134.00/ —		
Soda, Blchd.	147.00/150.00	150.00/ —			

§ On Dock Atlantic Ports. * Freight allowed. † Varying Freight Allowances

NEW YORK RAG MARKET

New Domestic Cotton Cuttings
Delivered Mill Basis
PRICES NOMINAL

	Per 100 lbs.
No. 1 White Shirts	$13.50/$14.00
No. 1 Unblchd. Muslins	16.00/ 16.75
Blchd. & Unblchd. Underwears	15.00/ 15.50
No. 1 Light Silesias	7.00/ 7.50
No. 1 Light Blue Overalls	7.25/ 8.00
Percales	6.00/ 6.50
No. 1 Light Prints	5.00/ 5.50
Suntan Khakis	5.50/ 6.25
Cottonades	3.25/ 3.75
No. 1 Washables	2.50/ 2.75

Old Domestic Cotton Rags

(Prices to Dealers, f.o.b. Ship. Pt.)

	Per 100 lbs.
Mixed White	$3.00/$3.25
Cotton Pants & Overalls	2.00/ 2.25
Twos and Blues, Repacked	1.50/ 1.75
No. 2 Roofing	.60/ .70

COTTON LINTERS

Memphis Market
f.o.b. Oilmills

Week Ended December 16	For 100 lbs.
Grade 1 n.a.	
2	$9.50/ $9.25
3 1 cut—felting	8.50/ 8.00
4	7.75/ 7.00
5	6.75/ 6.25
6	6.00/ 5.50
7	5.25/ 5.00

*Based on 73% cellulose.

Old Rope & Bagging

(Prices to Dealers, f.o.b. N.Y.)

	Per 100 lbs.
New Burlap Cuts	$4.50/$5.00
Scrap Burlap	3.50/ 4.00
Australian Wool Pouches	5.25/ 5.75
Gunny	5.00/ 5.25
No. 1 Domestic Manila Rope	7.00/ 7.25
No. 1 Foreign Manila Rope	6.25/ 6.50
Domestic Sisal Strings	4.00/ 4.50

WASTE PAPER MARKET

Mill Prices, f.o.b. Trucks Shipping Point — Includes Brokerage

These quotations are a partial indication of the price range on volume tonnage in each market on the date specified, as gathered from major dealers. SPECIAL PACKINGS AND SPOT TONNAGE NOT INCLUDED. Prices nominal.

	New York	Boston	Chicago	Los Angeles
	December 16	December 16	December 16	December 16
No. 1 Mixed Paper	$4.00/ 6.00	5.00/ 7.00	4.00/ —	12.00/ —
No. 1 News	13.00/ 15.00	14.00/ —	14.00/ —	11.00/ —
Overissue News (Lg. size)	16.00/ 18.00	12.00/ 14.00	19.00/ —	13.00/ —
Mill Wrappers	11.00/ 13.00	12.00/ 14.00	7.00/ —	13.00/ —
Old Corrugated Containers	24.00/ 25.00	20.50/ 21.00	25.00/ —	18.00/ —
Super Resorted Kraft Paper	30.00/ 35.00	35.00/ 42.50	35.00/ —	45.00/ —
New Double Kr. Ld. Corr. Cuts	25.00/ 30.00	35.00/ 37.00	35.00/ —	30.00/ —
(Semi-chem. medium)	45.00/ 50.00	45.00/ 50.00	45.00/ 50.00	35.00/ 45.00
New 100% Kraft Corr. Cuts	50.00/ 55.00	50.00/ 55.00	55.00/ —	40.00/ —
New Br. Kraft, Env. Cuts	65.00/ 70.00	70.00/ 75.00	55.00/ —	45.00/ 50.00
New Br. Kr. Bag Waste Prntd.	55.00/ 60.00	55.00/ 60.00	50.00/ —	45.00/ 50.00
New Br. Kr. Bag Waste Unprintd	60.00/ 65.00	65.00/ 75.00	65.00/ —	45.00/ 50.00
No. 1 Groundwood Shvs.	25.00/ 30.00	24.00/ 30.00	16.00/ —	25.00/ 30.00
White Newsblanks	50.00/ 55.00	52.50/ 57.50	40.00/ —	55.00/ —
No. 1 Soft White Shvs.	55.00/ 60.00	60.00/ 65.00	60.00/ —	— / —
Super Soft White Shvs.	65.00/ 75.00	75.00/ 85.00	70.00/ —	— / —
Hd. White Shvs.	90.00/ 95.00	100.00/110.00	90.00/ —	85.00/ 90.00
Hd. White Env. Cuts	115.00/125.00	120.00/130.00	100.00/ —	100.00/110.00
Col. Tab. Cards	50.00/ 60.00	55.00/ 62.00	47.50/ —	32.50/ —
Manila Tab. Cards	60.00/ 70.00	70.00/ 75.00	65.00/ —	65.00/ —
No. 1 Col. Ledger	28.00/ 32.00	30.00/ 35.00	40.00/ —	22.50/ —
White Ledger	45.00/ 50.00	50.00/ 55.00	52.50/ —	35.00/ —
Mixed Book & Mag.†	18.00/ 20.00	19.00/ 20.00	12.00/ —	— / —
No. 1 Books‡	25.00/ 27.00	22.00/ 24.00	27.50/ —	— / —

† Includes Time & Life; no coarse groundwood. ‡ Not to exceed 10% of groundwood.

PRICES OF MATERIALS

Aluminum sulphate:			
coml. bulk, c.l. wks.	cwt.	2.00	/ —
iron-free, c.l. wks.	cwt.	3.55	/ —
Casein, acid prec.:			
dom. sh. pt. c.l. (30 mesh)	cwt.	56.00	/ —
Arg. ex. dock	cwt.	21.50	/22.50
New Zealand	cwt.	24.50	/25.00
Caustic soda:			
c.l. wks. solid, 76%	cwt.	4.30	/ —
flak. & grd. drums, c.l.	cwt.	4.70	/ —
liquid 50% tanks		2.90	/ 3.00
liquid 73% tanks		3.00	/ —
China Clay			
dom., dry-grd., airfloat:			
325 mesh bgs., c.l. Geo.	ton	10.00	/ —
300 mesh, bgs., c.l. Geo.	ton	13.50	/14.50
imp., white, lump, c.l. ex. dock		20.00	/35.00
Chlorine:			
single-unit tanks, works	cwt.	3.15	/ —
multiple unit, 2-5 cars per yr.		5.25	/ 4.05
Lime:			
hydrated, bulk, c.l. N.Y.	ton	23.63	/ —
quicklime, bulk, c.l. N.Y.	ton	22.13	/ —
Gum rosin:			
K, M, N, drums, c.l. Savan.	cwt.	7.40	/ 7.92
Rosin size:			
70%, gum & pale paste, tank cars, south, sh. pt.	cwt.	7.38	/ 7.48
Saltcake:			
dom. bulk, 100% anh. wks.	ton	28.00	/ —
Soda ash:			
light, 58% ash bags, wks.	cwt.	1.85	/ —
bulk, c.l. wks.	cwt.	1.60	/ —
Sodium chlorate:			
drums, c.l., wks.	cwt.	9.00	/ —
drums, l.c.l., wks.	cwt.	9.50	/10.50
Sodium peroxide:			
dms., c.l. E. of Miss.	lb.	.20½	/ —
l.c.l. (same basis)		.21	/ .21½
Sodium silicate, 40° Be.:			
tank-cars, wks.	cwt.	1.20	/ —
drums, c.l. wks.	cwt.	1.55	/ —
47° Be. WW.			
tank-cars, c.l. wks.	cwt.	1.90	/ —
drums, c.l. wks.	cwt.	2.25	/ —
Soybean, protein:			
chem. isol., wks. c.l. bags	lb.	.23	/ —
Starches:			
Corn, multiwalls, c.l. prod. plant:			
pearl	cwt.	6.49	/ 6.75
white, dextrins	cwt.	8.08	/ 8.20
chlorinated	cwt.	8.25	/ 8.35
potato, Idaho, c.l. wks.	cwt.	6.50	/ —
East, fr. all. 50 cents cwt.			
potato, Maine, f.o.b. wks.	cwt.	6.25	/ —
Sulphuric acid:			
60° Be. cbys. c.l. wks.	cwt.	2.00	/ —
l.c.l. wks.	cwt.	2.45	/ —
tank-cars, wks.	ton	18.60	/ —
Sulphur:			
crude, c.l. mines, contract,	long ton	23.50	/ —
f.o.b. vessels Gulf dock	ton	25.00	/ —
Sulphur dioxide:			
liquid, coml. cyl., wks.	lb.	.10	/ .12
multi-unit cars, wks.	lb.	.0535/	—
Talc, fibrous grd., bags:			
c.l. wks., N.Y.	ton	28.00	/ —
l.c.l. wks., N.Y.	ton	31.00	/36.00
Titanium dioxide:			
anstase, c.l. dlvd. E. bags	lb.	.25½	/ —
l.c.l. dlvd.	lb.	.26½	/ —
rutile, c.l. dlvd.	lb.	.27½	/ —
l.c.l. dlvd.	lb.	.28½	/ —

PAPER PEOPLE

Paul F. Peterson

Frank R. Hamilton

Top Management Changes at Simpson

Simpson Paper Co., a division of Simpson Timber Co., Seattle, Wash. has announced two top management organizational changes at the company's Everett mill. Promoted were Paul F. Peterson to the position of plant manager and Frank R. Hamilton to director of research and product development.

Mr. Peterson will direct all manufacturing operations in both the pulp and paper mills of the Everett plant plus the engineering and purchasing functions. He is a 20-year veteran with Simpson and its predecessor, Everett Pulp and Paper Co. In recent years he has been successively staff assistant to the general manager, staff assistant and comptroller and, since August 1, 1957, administrative director. He is a 1955 graduate of the Advanced Management Seminar conducted by the University of Washington.

Mr. Hamilton will direct all research, technical and quality control efforts in the mills. He has had 19 years experience in the paper industry, 12½ with Allied Paper Mills in Kalamazoo where he engaged in technical research. He joined Simpson in 1951 as technical director, and he has been successively assistant general superintendent, general superintendent and production manager.

J. C. Bauman

Appointed to Multiwall Bag Sales Post

Union Bag-Camp Paper Corp. has appointed J. C. Bauman western district manager of multiwall bag sales. A member of the Union organization since 1950, Mr. Bauman previously served as a multiwall bag sales representative. He will headquarter in the company's Chicago office.

Lawrence Resigns from Raymond Bag

J. H. Lawrence has resigned as vice president of Raymond Bag Corp., Middletown, Ohio.

Since the merger of the former Raymond Bag Co. with the Albemarle Paper Manufacturing Co., Richmond, Va., Mr. Lawrence has been in charge of manufacturing in Middletown and of the parent company's Multiwall Bag operations in Richmond.

Prior to the merger in November 1955, Mr. Lawrence was vice president and secretary and a director of Raymond Bag Co. He served ten years as secretary of the former company. Including his two years with the new company, Mr. Lawrence had been associated with Raymond almost 25 years.

Consolidated Announces Promotions

Biron Division of Consolidated Water Power & Paper Co. has announced the following four promotions:

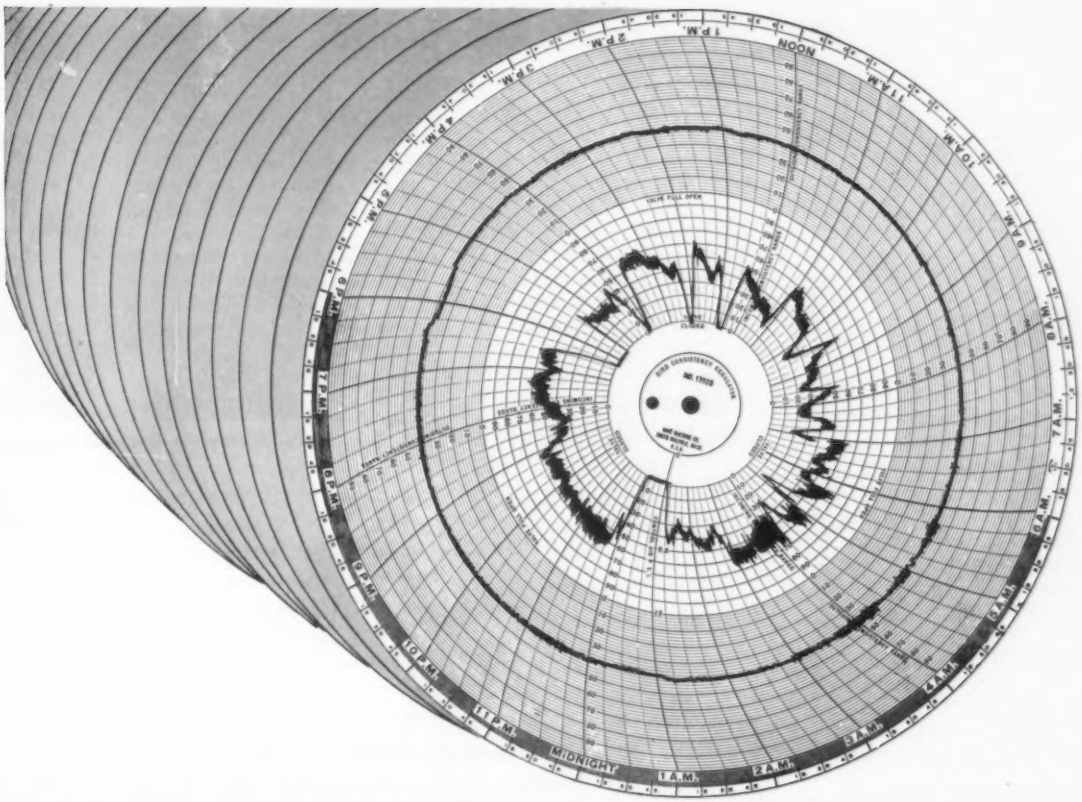
Ken Kruger has been appointed assistant to the production manager. Granville Weaver has been named Biron Laboratory supervisor, succeeding Mr. Kruger, while Clifford Papke has been named assistant to the laboratory supervisor succeeding Mr. Weaver. Darrel Alverson has been appointed assistant to the sanitation foreman.

Mr. Kruger joined the company in 1926 at Wisconsin Rapids Division Laboratory and in 1955 was transferred to the Biron Laboratory as supervisor. Mr. Weaver began his employment with the company's Biron Division in 1934 and worked in various capacities there before becoming assistant to the laboratory supervisor in 1945. Mr. Papke joined the company in 1947 and has worked at the Biron Laboratory since 1950. Mr. Alverson began work with the company in 1939 and has been a supercalender operator since 1947. He succeeds Edward H. Weil who has been assigned to the Biron Winder and Super Department for special projects.

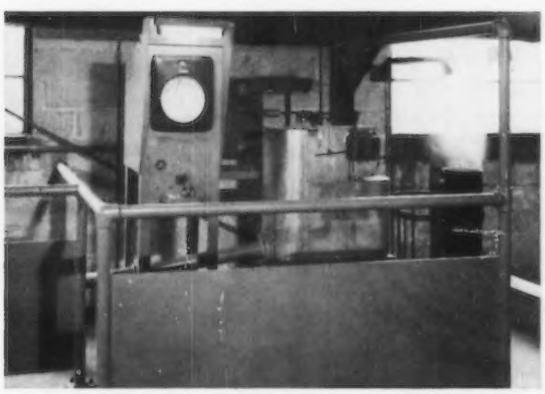
Brookshire C. Moore

Riegel Names Supt. For New Carolina Mill

Riegel Paper Corp. has appointed Brookshire C. Moore as superintendent of its new paper mill under construction at Acme, N. C. Mr. Moore has had over 20 years experience on paper machines and comes to Riegel from East Texas Pulp & Paper at Evandale, Texas. Before that he was employed by International Paper, Georgia Kraft, and Potlatch Forest.



SAVE MONEY DAY AFTER DAY with BIRD CONSISTENCY REGULATORS



The Bird Consistency Regulator installed on board filler stock directly ahead of the machine Jordans.

Precise consistency control by Bird Regulators is paying off in mills making every kind and grade of pulp, paper and board.

Bird Consistency Regulators prevent the waste of stock incurred by running overweight. They provide continuous records of both incoming and outgoing consistencies every hour of the day and night.

Ask us for recommendations and estimates.

BIRD MACHINE COMPANY

SOUTH WALPOLE, MASS.

REGIONAL OFFICES: EVANSTON, ILLINOIS
PORTLAND, OREGON • ATLANTA, GEORGIA

Canadian Manufacturers of Bird Machinery
CANADIAN INGERSOLL-RAND COMPANY, Limited, Montreal

Watervliet's Ferguson Retires

George K. Ferguson, president and general manager of the Watervliet Paper Co. nearly 28 years, will retire January 1.

Three Retire At Marathon

Retirement of three employees wtih a total of 112 years service has been announced by Marathon Corp., Northern Division, Green Bay, Wis.

Those who have retired are Frank Mande, chief electrician, with 42 years service; Peter Jauquet, pulp mill supervisor, 37 years; and Mrs. Edna Gillespie, 33 years.

Mr. Mande was promoted to chief electrician in 1936. He supervised the construction of the power transmission line from Green Bay to power dams on the Menominee River for Northern Paper Mills.

Mr. Jauquet joined Northern Paper Mills in 1920 as a sulphite pulp cook. After several other jobs in the pulp mill, he was promoted to foreman in 1940 and then pulp mill supervisor in 1945.

Most of Edna Gillespie's service has been in the converting department, working on cabinet tissues, and more recently on the facial line.

Promoted at CZ Printing Paper Div.

Richard H. DeKay has been promoted to assistant sales manager of Crown Zellerbach's printing paper division. He will be located at corporate headquarters in San Francisco and will be responsible for the sale of printing papers to distributors in Pacific Coast states.

Mr. DeKay joined the Zellerbach Paper Co. in 1947 as a staff assistant in the printing paper merchandising department in Oakland. He later became a printing paper salesman, and in December 1952 was transferred to Los Angeles, where he did sales promotion work. In January 1955, he became manager of the printing paper merchandising department of Zellerbach Paper Co. in Seattle.

T & H Promotes Glover in Sales Post

John G. Glover has been appointed manager of sales to merchants of Tileston & Hollingsworth Co., Boston. He joined their sales force in 1937 and has been handling sales to merchants since 1948.

Waxed Paper Council Elects Officers

Alfred E. Southon, chairman of the board of Kalamazoo Vegetable Parchment Co., has been re-elected to his fifth term as president of the Waxed Paper Merchandising Council and chairman of its board of directors.

Also re-elected as vice president of the Council and vice chairman of its board of directors is George C. Wieman, divisional sales administrator of Western-Waxide division of Crown Zellerbach Corp.

Louis A. Fisher, president of Fabricon Products, and E. M. McCourt, sales manager of Consolidated Water Power and Paper, were re-elected to the board of directors.

The executive committee of the Council's board for the coming year includes, in addition to Mssrs. Southon, Wieman and Fisher, James V. Melton, sales director of the waxed paper division of Pollack Paper Corp., and Harold E. Pierce, sales manager of Marathon Corp.'s bakery packaging division.

Figures of the Week

PAPER PRODUCTION RATIO REPORT—American Paper & Pulp Assn. Figures

(Production as percent of normal capacity)

COMPARATIVE WEEKLY SUMMARIES

1957	Nov. 9 89.7	Nov. 16 91.7	Nov. 23 91.9	Nov. 30 86.0r	Dec. 7 88.7
1956	Nov. 10 99.4	Nov. 17 97.3	Nov. 24 92.5	Dec. 1 98.6	Dec. 8 99.3

r Revised.

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1957	94.2	97.0	97.1	94.0	94.6	93.3	75.6	90.5‡	85.8‡	92.4‡	89.8‡		
1956	99.6	102.6	102.9	102.5	101.8	99.9	85.6	96.7	94.3	99.5	97.6	90.9	97.9

‡ Preliminary.

COMPARATIVE YEARLY SUMMARIES

	1950	1951	1952	1953	1954	1955	1956	1957
Year to Date	96.6	99.6	90.7	93.7	92.3	95.9	98.5	91.1
Year Average	95.8	98.0	88.6	92.3	91.6	94.9	97.9	

All of the above data is based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

PAPERBOARD OPERATING RATIOS†

COMPARATIVE WEEKLY SUMMARIES

1957	Nov. 9 94	Nov. 16 94	Nov. 23 94	Nov. 30 86	Dec. 7 84
1956	Nov. 10 95	Nov. 17 94	Nov. 24 89	Dec. 1 86	Dec. 8 95

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1957	91	94	94	92	93	91	72	94	91	97	92		
1956	100	100	99	100	99	98	77	95	89	96	93	84	94

† *Percents of operation based on "Inch-Hours" reported on a 6-day basis to the National Paperboard Association.*

SUMMARY OF PAPERBOARD STATISTICS—National Paperboard Assn. Figures

ITEM	THIS WEEK ENDING Dec. 7, 1957	LAST WEEK ENDING Nov. 23, 1957	CUMULATIVE TO DATE Jan. 1 to Dec. 7, 1957
% Activity	84%	94%	91%
	Tons	*Tons*	*Tons*
Total Production	258,322	269,285	13,370,110
Liner	93,353	100,311	4,625,688
Corrugating Material	40,577	42,738	2,052,782
Chip & Filler Board	5,357	5,931	255,728
Total Containerboard	139,287	148,980	6,934,198
Folding	43,938	43,912	2,442,014
Set-Up	9,927	10,258	543,791
Special Food Board	22,214	19,684	1,155,498
Other	42,956	46,451	2,294,609
Total Boxboard	119,035	120,305	6,435,912
Total Orders	*Tons*	*Tons*	
Received	316,667	237,804	
Unfilled End of Week	409,957	355,159	

George J. Smart

Hammermill Makes Sales Staff Changes

George J. Smart has been named sales manager, printing papers, for the Hammermill Paper Co., Erie, Pa. He succeeds the late Grant Richardson in the responsibility for heading up distribution of Hammermill grades sold through the mill's paper merchant distributors.

Prior to assuming his new duties, Mr. Smart was district sales manager for Hammermill's eastern sales territory, with headquarters in Hammermill's New York City sales office. He will now be located at the Hammermill main office, Erie, Pa.

Wilbur T. Eldredge, formerly district sales manager of Hammermill's southeastern sales territory, has succeeded Mr. Smart as head of the mill's New York City sales office and Eastern territory manager.

Robert D. DeVitt succeeds Mr. Eldredge as district sales manager of the southeastern sales territory, with headquarters in an Atlanta office being opened by Hammermill at an early date.

In another Hammermill sales department change, Virgil E. Heidbrink has been transferred from the Chicago sales office to the Dallas sales office. Formerly district sales representative in the Hammermill central sales territory, he has been promoted to assistant district sales manager of the southwestern territory.

Warren R. Omark has been promoted to assistant district sales manager of Hammermill's eastern territory.

Marathon Promotions at Green Bay

Marathon Corp., Northern Paper Mills Division, has announced four promotions at its Green Bay, Wis., plant.

Sylvester Hoersch was promoted to project engineer. He will assist the plant engineer in special assignments.

Succeeding Mr. Hoersch as maintenance engineer is James Fox, who joined Marathon in November, 1956.

Promoted to chief electrical engineer was John Haanen, who has been with the company since 1953.

Al Kreuser, a veteran of 32 years' service with Marathon, was promoted to pulp mill supervisor. He joined Northern Paper Mills in 1925 as a pulp tester. In 1933, he became a sulphite pulp cook, and for the past eight years has served as a temporary shift supervisor.

Dr. Fritz Rosenthal

Research Chemist Joins Knowlton

Dr. Fritz Rosenthal has been named to the research department of Knowlton Brothers Inc. as director of product development. He will join Horace Spencer, veteran Knowlton technologist, in directing the research activities of the company.

The addition, now underway, of a new development and research laboratory is the latest step in the company's current million dollar modernization and expansion program. The research staff will specialize in the application of new types of fibers and additives to paper manufacture, and in the development of new and improved technical papers for industrial use.

Dr. Rosenthal, a graduate of the University of Wuerzburg, Germany, received his PhD. in organic chemistry, cum laude, in 1935 from the University of Bern, Switzerland. Subsequently, he was associated with the University of Geneva in post-doctoral research in physical chemistry. He came to the United States in 1936.

His background includes five years' service with the paper converting industry, as senior chemist for Nashua Corp., Nashua, N. H. Prior to joining Knowlton Brothers, he was associated for two years with the Armour Research Foundation in Chicago.

Thomas H. Dermody

Elected VP of Ruberoid

Ruberoid Co. has elected Thomas H. Dermody, comptroller, to be vice president and comptroller.

Mr. Dermody, who will continue to make his headquarters at the firm's central accounting office in South Bound Brook, N. J., has been comptroller since 1943. Before joining Ruberoid as office manager in 1941, he was associated with Price Waterhouse & Co., a public accounting firm, for nearly ten years.

ADVERTISEMENT

Meet Huyck's **WICKER**

Dr. Dan B. Wicker is Huyck's Director of Physical Research and Development. His extensive work on scientific instruments to measure felt performance quantitatively on paper machines enables Huyck to apply advanced techniques to custom-engineer felts for a precise job. Dan was previously associated with Eastern Corp. and Thilmany Pulp & Paper Co. A graduate of the Institute of Paper Chemistry, he provides the experienced leadership that assures the latest and best felts for all papermakers.

HUYCK FELTS

First in Quality . . . First in Service Since 1870

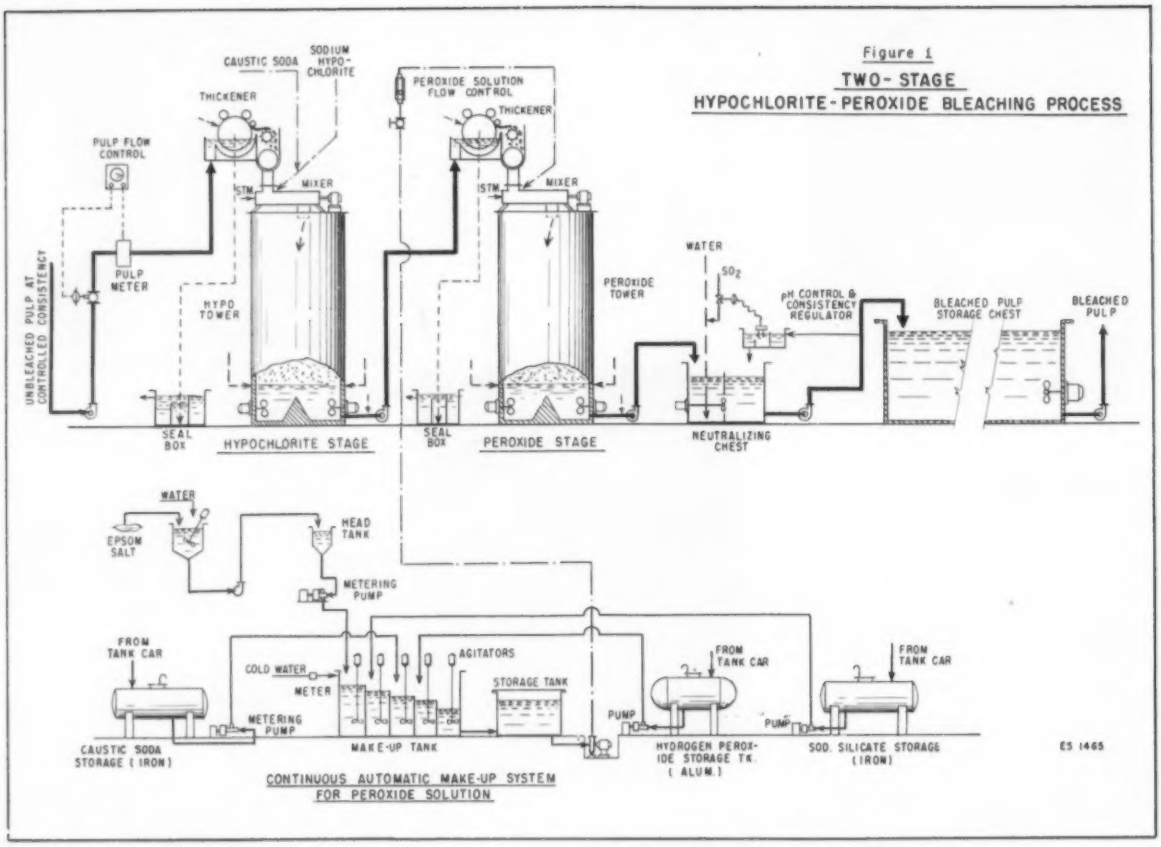


Figure 1
TWO-STAGE
HYPOCHLORITE-PEROXIDE BLEACHING PROCESS

How to Bleach Mechanical Pulp Made from Chips

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A combination of peroxide and hypochlorite bleaching was found to be most effective. The order of treatment with these two chemicals for best results depends on the wood species used.

Commercial development of a new pulping process, groundwood from hardwood chips, was first hailed in this magazine less than two years ago. Since then, the rapid installation of the new process in a number of mills has justified the enthusiasm of your editors. One of the important problems raised by the new pulp is its dark color. Here is the first report of an intensive study on bleaching this pulp.

Chip mechanical pulp is usually darker in color than ordinary groundwood, especially if the wood chips are pretreated with sodium hydroxide. This characteristic has promoted an interest in the development of suitable bleaching procedures for these pulps. For the past two years, Du Pont staff members have carried out bleaching trials in their sales technical laboratory at Niagara Falls and in commercial mills in order to develop satisfactory bleaching procedures. In these studies, chip mechanical pulps produced from various types of softwoods and hardwoods have been bleached with peroxide alone and with peroxide combined with sodium hypochlorite and with sodium hydrosulphite. The peroxide solutions have been prepared with hydrogen peroxide alone and with hydrogen peroxide and sodium peroxide.

These studies have shown definite advantages for bleaching chip mechanical pulp with peroxide as compared to hypochlorite bleaching; the advantages include better yield, higher opacity, reduction of yellow cast in the pulp and improved brightness stability.

Bleaching Chip Mechanical Pulp

As a result of the Du Pont studies, single-stage and two-stage processes have been devoloped for bleaching chip mechanical pulp. Typical equipment layouts are shown in Figures 1, 2, and 3. The bleaching results obtained in the different processes are summarized in Tables I and II. All of the results except those obtained on mixed beech, birch and maple pulp were from pulp which had aged to a varying degree in transit from the point of preparation to the laboratory. Evaluations have shown that fresh pulp responds more favorably to bleaching than does aged pulp; the results shown, therefore, might be higher if fresh pulp had been used.

Acidification of the chip mechanical pulp prior to bleaching generally results in a final brightness 3-4 G. E. units higher than is obtained with unacidified pulps. The acidification conditions the pulp for a better response to the peroxide bleach. The data given in Tables I and II are from bleaching evaluations on pulps which have been acidified prior to bleaching.

Single-Stage Peroxide Bleaching

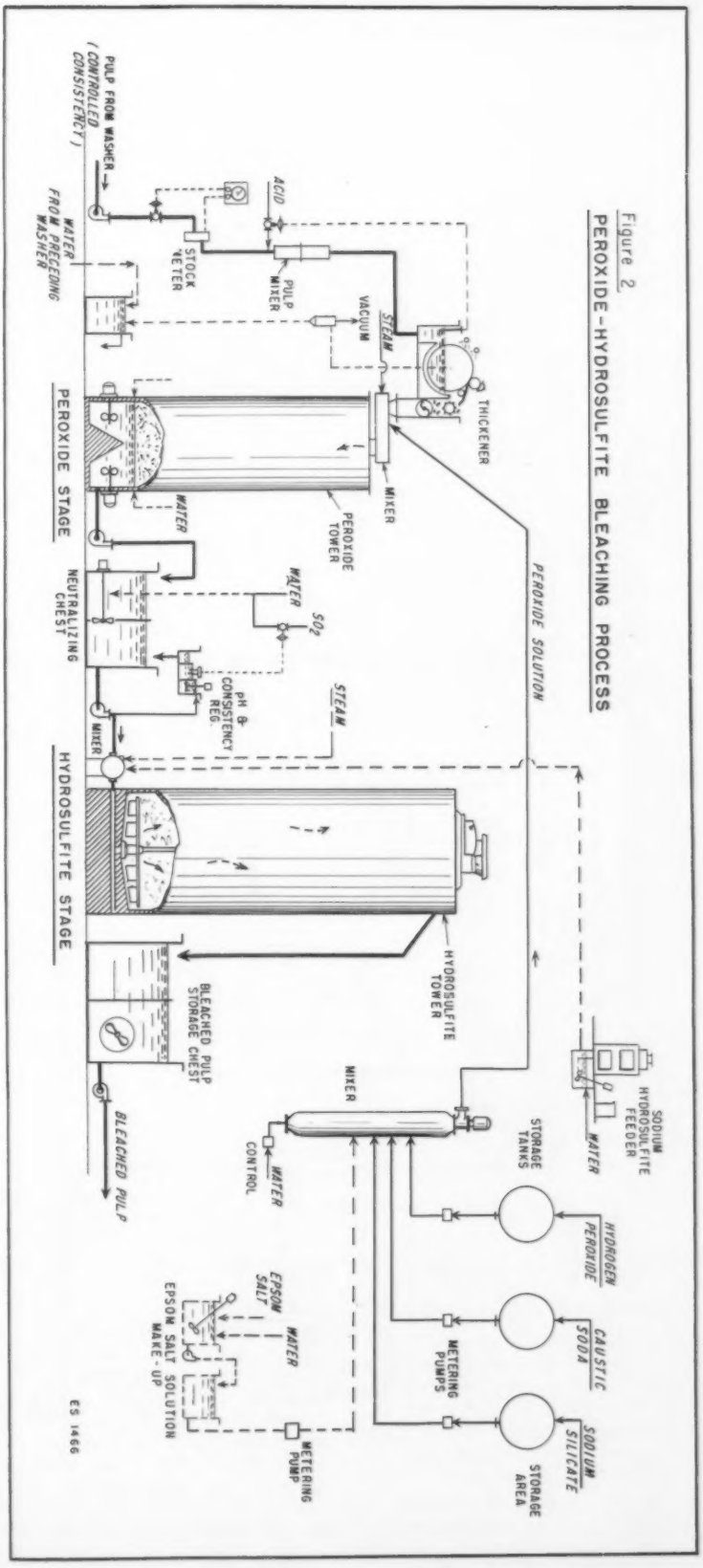
Bleaching results obtained by a single-stage peroxide bleach are shown in Table I. Chip mechanical pulps prepared from both softwood and hardwood chips, with and without a chemical pretreatment, were bleached.

Pulp prepared from a mixture of caustic-treated beech, birch and maple attained the highest brightness after a single-stage peroxide bleach (74 G. E.). The same type pulp prepared from caustic-treated white oak and birch was bleached to the 70 G. E. brightness level by a single peroxide stage. Caustic-treated balsam, oak, gum and yellow poplar gave brightnesses of 65-66 G. E. units, whereas Douglas fir and cottonwood chip mechanical pulps proved to be the most difficult to bleach.

Chip mechanical pulps from sodium bisulphite-treated aspen, oak, and a mixture of beech, birch, and maple chips were bleached to the 71-73 G. E. brightness level in a single peroxide stage. Brightnesses in the 60-70 G. E. level were obtained by the application of a single peroxide stage using pulp produced from sodium bisulphite-treated gum, soft maple, yellow poplar, cottonwood, and balsam.

Untreated ponderosa pine, yellow poplar, soft maple, white fir, balsam, and sugar pine chips produce a chip

Figure 2
PEROXIDE-HYDROSULFITE BLEACHING PROCESS



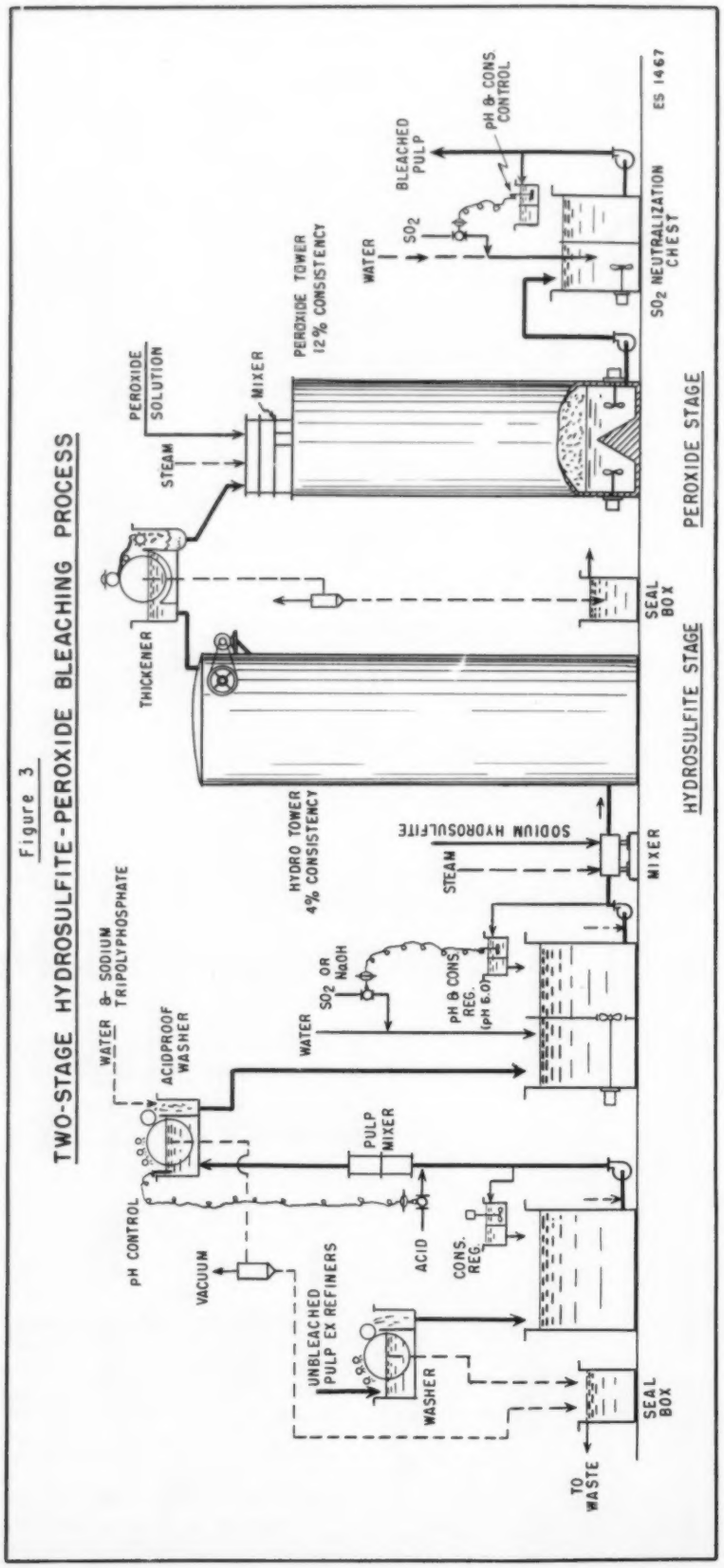


Figure 3

mechanical pulp which can be bleached in a single peroxide stage to a 60-70 G. E. level. Similar pulp produced from Douglas fir, jack pine, and western hemlock can be bleached to a 50-60 G. E. level.

The process used in a single-stage peroxide bleaching consists of the first four steps of the sequence described below for a peroxide hydrosulphite bleachery.

Two-Stage Bleaching

Table II contains data on two-stage bleaching of several wood species with and without chemical pretreatment. In this table the results on peroxide-hydrosulphite and hypochlorite-peroxide sequences are shown.

In initial bleaching plans for chip

TABLE I—BLEACHING OF CHIP MECHANICAL PULP SINGLE-STAGE PEROXIDE[1]

Sodium Hydroxide-Treated Chips	%	Brightness[3]	
Wood Species	H_2O_2	Unbl.	Bl.
Soft Maple (MW)[2]	0.8	50.5	71.0
Aspen (N)	0.8	54.9	70.2
Beech, Birch, Maple(N)	0.8	46.0	63.4
Beech, Birch, Maple(N)	1.25	46.0	74.2
Birch (N)	1.25	48.0	69.8
White Oak (S)	1.25	44.3	69.2
Balsam (MW)	1.25	49.8	66.7
Yellow Poplar (S)	1.25	55.6	66.4
White Oak (S)	1.25	34.0	64.9
Gum (S)	1.25	34.0	64.4
Cottonwood (S)	1.25	42.4	58.0
Douglas Fir (W)	1.25	22.6	39.8
Sodium Bisulphite-Treatment			
Soft Maple (MW)	0.4	54.6	68.9
Balsam (MW)	0.4	55.5	61.2
Soft Maple (MW)	0.8	55.0	72.0
Beech, Birch, Maple(N)	0.8	47.4	67.5
Yellow Poplar (S)	0.8	52.2	60.1
West Hemlock (W)	0.8	41.2	51.3
Jack Pine (N)	0.8	39.7	48.2
Aspen (N)	1.25	57.9	72.6
White Oak (S)	1.25	43.6	71.7
Beech, Birch, Maple(N)	1.25	47.4	71.5
Gum (S)	1.25	44.0	70.0
Yellow Poplar (S)	1.25	61.8	66.1
Cottonwood (S)	1.25	52.0	62.9
Balsam (MW)	1.25	52.1	61.1
Jack Pine (N)	1.25	44.9	57.9
Ponderosa Pine (W)	1.25	45.0	56.0
Red Alder (W)	1.25	30.3	46.3
Douglas Fir (W)	1.25	23.0	37.9
Untreated Chips			
Balsam (MW)	0.4	57.5	65.2
Jack Pine (N)	0.8	49.9	56.0
West Hemlock (W)	0.8	38.5	49.0
Ponderosa Pine (W)	1.25	56.4	69.8
Yellow Poplar (S)	1.25	53.8	69.3
Soft Maple (MW)	1.25	46.0	68.6
White Fir (W)	1.25	50.0	67.0
Sugar Pine (W)	1.25	50.0	60.0
Douglas Fir	1.25	49.0	58.0

[1]Bleaching Conditions: 12% Consistency, 110°-180°F., 1½-2 hours

[2]Wood Source: (N) Northeast, (MW) Midwest, (S) South, (W) West

[3]G E. Brightness, Air Dry at Room Temperature

mechanical pulp produced from dense hardwoods the use of calcium or sodium hypochlorite was considered and in at least one known case has been applied commercially. The pulp from this type of bleaching process (especially chip mechanical pulp from caustic-treated hardwood) has a definite yellow hue which proves undesirable when the pulp is used in the paper furnish.

In an attempt to overcome the yellow hue, a peroxide bleaching stage after the hypochlorite stage was tried. Laboratory and mill trials showed that the yellow hue was reduced. Further experimentation proved that a peroxide-hydrosulphite bleaching sequence would eliminate practically all of the yellow cast of bleached chip mechanical pulp produced from caustic-treated hardwood chips.

This process consists of the following steps:

1—Pulp from final refining step of the chip mechanical pulping process is washed to remove the chemical used in the initial chip treatment.

2—Pulp slurry is diluted to 4%-5% consistency and acidified with approximately 2% H_2SO_4 to obtain a pH of 2.5 to 3.0. It is then washed and thickened to 15% consistency using fresh water showers on the washer.

3—Heat is applied to raise the pulp temperature to 180°F. and the peroxide solution (with 0.5% sodium tripolyphosphate included) is mixed with the pulp. Pulp is retained in tower for 1½ hours at 12% consistency.

4—After bleaching is completed the pulp is diluted at the bottom of the tower to 4%-5% consistency and the pH adjusted to 6.0 in the neutralization chest with sulphur dioxide.

5—Pulp is heated to 140°F. and sodium hydrosulphite solution mixed with the pulp. (Sodium tripolyphosphate may be added at this point instead of with the peroxide solution; see step 3 above.)*

6—Pulp is transferred to the low-density upflow tower which has sufficient size to retain it for 1 hour at 4%-5% consistency.

7—The pulp is discharged continuously from the top of the low-density tower into a bleached pulp storage chest. Additional refining of the pulp is usually carried out before the pulp is incorporated in the paper furnish. (See Figure 2).

Chip mechanical pulp prepared from a mixture of caustic-treated beech, birch, and maple chips has been bleached to a 78 G. E. brightness by the above peroxide-hydrosulphite bleaching procedure. Pulp produced from gum, oak, and balsam can be bleached to a 70 G. E. brightness level by the peroxide-hydrosulphite sequence. However, for the latter named pulpwoods a hypochlorite-peroxide bleaching process permits bleaching to a higher level (75 G. E.). The choice of the two-stage process used depends on the appearance of the final pulp produced by the two processes.

TABLE II—BLEACHING OF CHIP MECHANICAL PULP TWO-STAGE BLEACHING[1]

Sodium Hydroxide Treatment
Peroxide-Hydrosulphite Bleaching

Wood Species	% H_2O_2	% Hydro[2]	G. E. Brightness, A. D. Unbl.	Ex. 1st St.	Ex. 2nd St.
Beech, Birch, Maple (N)[3]	1.25	1.0	46	74.2	77.4
Balsam (MW)	1.25	1.0	34	64.9	69.6
White Oak (S)	1.25	1.0	49.8	66.7	69.6
Gum (S)	1.25	1.0	34	64.4	69.0
Douglas Fir (W)	1.25	1.0	22.6	39.8	44.6

Hypochlorite-Peroxide Bleaching

Wood Species	% Cl_2[4]	% H_2O_2	G. E. Brightness, O. D. Unbl.	Ex. 1st St.	Ex. 2nd St.
Beech, Birch, Maple (N)	10	1.25	46	64.0	76.0
Balsam (MW)	10	0.8	34	64.5	75.7
White Oak (S)	10	0.8	44.3	68.8	74.1
Gum (S)	10	1.25	34	62.7	73.5
Yellow Poplar (S)	10	0.8	55.6	64.0	66.2
Douglas Fir (W)	10	1.25	22.6	40.1	52.8

Sodium Bisulphite-Treatment
Peroxide-Hydrosulphite Bleaching

Wood Species	% H_2O_2	% Hydro	G. E. Brightness, A. D. Unbl.	Ex. 1st St.	Ex. 2nd St.
White Oak (S)	1.25	1.0	43.6	71.7	76.8
Gum (S)	1.25	1.0	44.0	70.0	74.8
Beech, Birch, Maple (N)	0.8	1.0	47.4	66.9	67.7
Red Alder (W)	1.25	1.0	30.3	46.3	54.3
Douglas Fir (W)	1.25	1.0	23.0	37.9	45.4

Hypochlorite-Peroxide Bleaching

Wood Species	% Cl_2	% H_2O_2	G. E. Brightness, A. D. Unbl.	Ex. 1st St.	Ex. 2nd St.
White Oak (S)	10	0.8	43.6	66.5	76.8
Beech, Birch, Maple (N)	7	0.8	47.4	66.0	75.3
Gum (S)	10	0.8	44.0	67.1	74.8
Yellow Poplar (S)	10	1.25	61.8	63.5	66.6
Red Alder (W)	10	1.25	30.3	52.7	66.2
Balsam (MW)	15	1.25	55.5	61.0	65.6
Ponderosa Pine (W)	10	1.25	45.0	42.7	54.8
Western Hemlock (W)	10	1.25	41.2	41.3	52.1
Douglas Fir (W)	10	1.25	23.0	37.2	49.1
Jack Pine (W)	10	1.25	39.7	36.6	47.5

Untreated Chips
Peroxide-Hydrosulphite Bleaching

Wood Species	% H_2O_2	% Hydro	G. E. Brightness, A. D. Unbl.	Ex. 1st St.	Ex. 2nd St.
Ponderosa Pine (W)	1.25	1.0	56.4	69.8	74.1
White Fir (W)	1.25	1.0	47.8	65.6	70.1
Douglas Fir (W)	1.25	1.0	45.1	63.1	68.1
Sugar Pine (W)	1.25	1.0	48.0	53.9	60.7

Hypochlorite-Peroxide Bleaching

Wood Species	% Cl_2	% H_2O_2	G. E. Brightness, A. D. Unbl.	Ex. 1st St.	Ex. 2nd St.
Western Hemlock (W)	10	1.25	38.5	44.4	56.8
Jack Pine (W)	10	1.25	49.9	44.0	54.4

[1]Bleaching Conditions:
Peroxide Stage — 12% Consistency, 110-180°F., 1½ to 2 hours
Hypochorite Stage — 12% Consistency, 100°F., 1 hour
Hydrosulphite Stage — 4% Consistency, 140°F., 1 hour
[2]Sodium Hydrosulphite
[3]Wood Source: (N) Northeast, (MW) Mid-west, (S) South, (W) West
[4]% Cl_2 as NaOCl

Wood Species Deciding Factor

The most efficient type of two-stage bleaching sequence for chip mechanical pulp produced from sodium bisulphite-treated wood chips depends on the wood species being used. For Douglas fir, ponderosa pine, red alder, balsam or a mixture of beech, birch, and maple, the hypochlorite-peroxide process has produced the best results. For gum and oak the peroxide-hydrosulphite bleach-

*U. S. Patent 2,707,144 assigned to the Scott Paper Company covers the use of an alkali metal polyphosphate in hydrosulphite bleaching. Any request for license should be directed to Scott Paper Company.

TABLE III—EFFECT OF BLEACHING SEQUENCE AND A CHELATING AGENT IN TWO-STAGE PROCESS[1] (G. E. UNITS)

Process	STPP[2] With Peroxide 1st Stage	STPP With Peroxide 2nd Stage	STPP With Hydrosulphite 1st Stage	STPP With Hydrosulphite 2nd Stage	No-STPP 1st Stage	No-STPP 2nd Stage
Peroxide-Hydrosulphite ...	73.7	77.5	72.7	77.0	72.7	76.2
Hydrosulphite-Peroxide ...			57.5	77.7		

[1]Unbleached brightness 46.0
[2]Sodium Tripolyphosphate

TABLE IV—PULP YIELD—CHIP MECHANICAL PULP

Chip Treatment	Unbl. G. E.	Single-Stage Process: Peroxide Brightness G. E. A.D.	O.D.	Yield %	Two-Stage Process: Hypochlorite Brightness G. E. A.D.	O.D.	Yield %	Two-Stage Process: Peroxide Brightness G. E. A.D.	O.D.	Yield %
NaOH ...	44.3	69.2	68.2	98.4	68.8	62.3	97.2	74.1	69.7	95.8
Na_2SO_3 ...	48.0	71.3	70.9	96.6	68.3	62.0	93.6	74.1	69.8	91.3

Wood Species: White Oak.
% Peroxide Used: 0.85% H_2O_2 in single-stage process; 1.2% H_2O_2 in single-stage process.
10% Cl_2 as NaOCl used in hypochlorite stage.
A.D. = Air Dry; O.D. = Oven Dry (1 hour @ 105°C. in air circulating oven).

ing sequence appears to be best, especially from the standpoint of pulp yield.

For the hypochlorite-peroxide bleaching sequence the pulp after acidification and thickening is heated to 100°F. and the hypochlorite solution mixed with the pulp. After retention in the first stage tower for one hour at 12% consistency the pulp is washed and thickened then bleached in the peroxide stage. The peroxide stage is carried out in equipment similar to that used in the first stage of the peroxide-hydrosulphite bleaching process.

Chip mechanical pulp prepared from untreated wood chips is bleached more satisfactorily by a peroxide-hydrosulphite bleaching sequence. Since only the softwoods and lightweight hardwoods can be processed in the chip mechanical process without chemical treatment, this bleaching response is not unexpected since it is well known that hypochlorite is generally not satisfactory for bleaching groundwood prepared from softwoods.

In the peroxide-hydrosulphite bleaching process the use of the chelating agent, sodium tripolyphosphate, increased the brightness about one G. E. unit over that obtained when sodium tripolyphosphate is not used. Laboratory evaluations show a definite advantage for using the sodium tripolyphosphate in the peroxide solution since the gain then shows up after the peroxide stage (see Table III). This is advantageous if pulp from the first stage can meet the brightness requirements for at least a portion of the mill's output. For optimum results in the hydrosulphite stage the pH of the pulp should be reduced to 6.0 before addition of the hydrosulphite.

Peroxide-Hydrosulphite or Vice Versa?

Evaluations of the use of a hydrosulphite-peroxide bleaching sequence to bleach chip mechanical pulp have shown that, for some pulps, the final brightness obtained is equal to a peroxide-hydrosulphite bleaching sequence. However, the equipment requirements are usually greater for the former, especially if an acid sour is required before bleaching and the hydrosulphite stage is operated at low consistency. Lower equipment cost and the generally higher brightness after the first stage makes the peroxide-hydrosulphite sequence a more attractive process. Table III shows the results of comparative bleaching trials on a chip mechanical pulp prepared from a mixture of beech, birch, and maple.

Bleaching White Oak Pulp

A pulp yield study was conducted on chip mechanical pulp produced from white oak. This work showed that peroxide bleaching produces a pulp with a higher yield than that produced by hypochlorite bleaching; 98.4 per cent vs. 97.2 per cent. Table IV summarizes this information.

The final oven dry (O. D.) pulp brightness abtained in a single-stage peroxide treatment was equivalent to the oven dry brightness obtained with the two-stage process. The yield of the pulp from the single peroxide stage was 3% to 5% higher than that obtained from the two-stage process.

Opacity Studies on Jack Pine

Opacity studies on peroxide-bleached chip mechanical pulp produced from

Groundwood-from-Chips Process

The dwindling supply of softwoods used for manufacturing groundwood in the northeast and northcentral parts of the United States has aroused interest in the use of the more abundant supply of hardwoods.*

The conventional method of grinding wood cannot be used to produce acceptable commercial pulps from the dense hardwoods; therefore, a new approach was necessary to produce the pulp desired. To meet this demand a process consisting of mechanical fiberization of wood chips which have been chemically pretreated with sodium hydroxide or sodium bisulphite was developed by the Forest Products Laboratory, Madison, Wis. This chemical pretreatment is usually required in case of dense hardwood chips but is not always necessary for softwood or lightweight hardwood chips. Even though the chemical treatment is not necessary to produce a satisfactory pulp from a softwood, the bleachability of the pulp is in some cases improved by the chemical treatment.

The process developed by Forest Products Laboratory meets the requirements for utilizing hardwoods. It produces pulps comparable to softwood ground-woods, gives high pulp yields, and, in addition, permits the use of sawmill waste. Commercial development of this process for utilization of hardwoods was carried out by Bauer Brothers Co. and Sprout Waldron Inc. Gould Paper Co., Lyons Falls, N. Y., was the first commercial producer of chip mechanical pulp from the hardwoods (beech, birch, and maple) using Bauer equipment. Since then there have been at least six more full plant or large scale pilot installations.

* Editor's Note—The anomaly of the situation is that the greatest interest and the largest installations of the new process have been in the South. Will the Northeastern mills with their very ample supplies of hardwood and lack of integrated pulping facilities let another opportunity to strengthen their positions go unavailed?

jack pine showed a definite advantage for peroxide bleaching as summarized in Table V.

The opacity drop with a single peroxide stage was 3-4 units as compared to 20 units when hypochlorite was used in conjunction with peroxide.

Equipment Required

Figure 1 shows a suggested equipment arrangement for a two-stage hypochlorite-peroxide bleaching sequence. In this equipment arrangement the pulp is bleached at medium consistency (12%) in both stages. A cascade type automatic makeup system is shown for preparation of the peroxide solution. If necessary, an acidification step can be incorporated by the use of an acid-pulp mixer as shown in Figure 2.

The installation shown in Figure 2 consists of a medium consistency (12%) peroxide stage followed by a low consistency (4%) hydrosulphite stage. The washing and thickening equipment for a system of this type is less than that required for the hydrosulphite-peroxide bleaching sequence shown in Figure 3.

Chemical Cost For Bleaching

Table VI, listing the chemicals and steam cost[1] for bleaching chip mechanical pulp by hypochlorite, peroxide, and hydrosulphite, can be used to obtain approximate costs for combination processes.

For a combination bleaching process using a peroxide (0.8% H_2O_2) stage followed by a hydrosulphite (1%) stage the table above shows a total chemical and steam cost of $10.50 plus $6.65 or $17.15 per ton of air dry pulp.

Reprints of this article will be available from the Electrochemical Dept., E. I. du Pont de Nemours, Wilmington, Del.

TABLE V—BLEACHED PULP OPACITY—CHIP MECHANICAL PULP (JACK PINE)

Chip Treatment	Pulp Pretreatment	Chemical Used Stage I	Chemical Used Stage II	Brightness Unbl.	Brightness Bl.	Opacity Unbl.	Opacity Bl.
Na_2SO_3	H_2SO_4	1.0% H_2O_2	1.0% $Na_2S_2O_4$	44.9	60.9	94.9	89.4
Na_2SO_3	H_2SO_4	1.5% H_2O_2	—	44.9	57.9	94.9	90.9
$Na_2SO_3 + SO_2$	None	0.5% H_2O_2	—	55.4	58.7	98.4	95.1
$Na_2SO_3 + SO_2$	H_2SO_4	15 % Cl_2 as NaOCl	1.0% H_2O_2	43.4	59.7	94.2	74.4
$Na_2SO_3 + SO_2$	H_2SO_4	1.5% H_2O_2	1.0% $Na_2S_2O_4$	43.4	58.2	94.2	81.2

TABLE VI—CHEMICALS COST FOR BLEACHING

Process Bleaching	% Chemicals Applied	Approximate Cost/Air Dry Ton of Pulp
Hypochlorite	10% Cl_2	$15.10
Peroxide[2]	0.8% H_2O_2 (100%)	$10.50
Peroxide	1.25% H_2O_2 (100%)	$14.35
Hydrosulphite[3]	1% Sodium Hydrosulphite + 0.5% STPP	$ 6.65

[1]Steam costs based on 100°F. for hypochlorite; 140°F. for hydrosulphite and 180°F. for peroxide. Acidification costs will be approximately 35c-40c per ton of pulp.
[2]Based on combination sodium peroxide-hydrogen peroxide solution and the use of 0.5% STPP.
[3]Based on sodium hydrosulphite.

OBITUARIES

Clement F. Sisson, 76, retired vice president of the Mac Sim Bar Paper Co. at Otsego, Mich., died at Ft. Meyers, Fla. December 13 after suffering a heart attack.

Mr. Sisson was affiliated with the paper industry for 47 years before retiring in 1952.

Ewan Charles Donald Cameron, 65, former secretary-treasurer of the James A. Rogers Co., died at Au Sable Forks, N. Y. on December 4.

Charlie Harrison, traffic manager of the Great Lakes Paper Co., Fort William, Ontario, died December 11 from a heart attack.

Brandon P. Hodges, 54, assistant secretary of the Carolina Division of the Champion Paper and Fibre Co., died December 4 at his home in Asheville, N. C.

Mr. Hodges, associated with Champion since 1954, was a former treasurer of the State of North Carolina and was considered one of that state's foremost authorities on taxation. He had headed North Carolina's first tax study commission in 1955 and at the time of his death was chairman of a new tax study commission.

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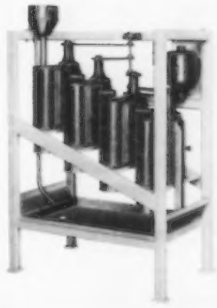
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Applications for Polyvinyl Alcohol in the Paper Industry

David F. Lowry
Chemical Division, The Borden Co.

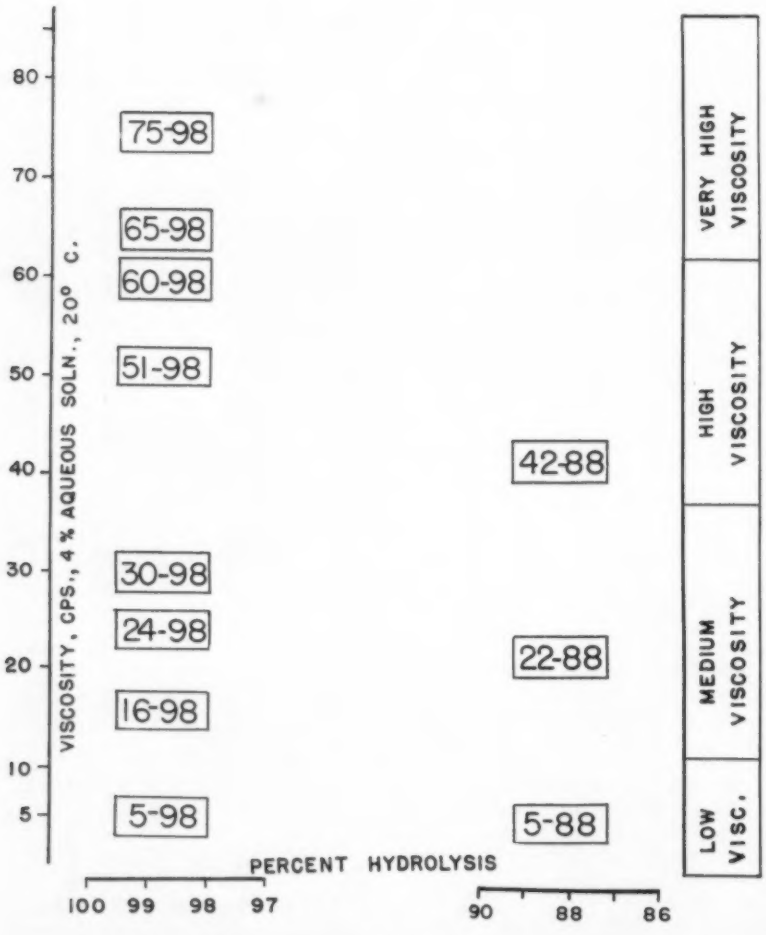
Polyvinyl alcohol is a chemically synthesized film-forming organic polymer with properties that can be carefully controlled during manufacture to assure the material best suited for the specific paper mill and converter use.

Polyvinyl alcohol is commercially described as either fully hydrolyzed, which means that the resin powder is 98-100 per cent polyvinyl alcohol, or partially hydrolyzed, which means that the resin composition corresponds to about 88 per cent vinyl alcohol and about 12 per cent vinyl acetate.

The fully hydrolyzed polyvinyl alcohol has greater water resistance, greater film strength and is pretty much insoluble in cold water. Fully hydrolyzed polyvinyl alcohols are manufactured in viscosities (4 per cent in water) ranging from 5 cps. viscosity to 75 cps. The partially hydrolyzed polyvinyl alcohols are somewhat water sensitive, but have greater emulsifying properties. These types of polyvinyl alcohol range in viscosity from 5 cps. to 42 cps.

It is interesting to note that the paper industry has application only for the fully hydrolyzed type of polyvinyl alcohol because of its greater strength, film-forming properties, moisture resistance, resistance to gas transfer, resistance to organic solvents, and lower cost.

Since polyvinyl alcohol is one of the strongest of the adhesive film formers available to the paper maker, we can well imagine that it would have specific applications all the way from the wet end of the paper machine to off-machine coating and converting.



TYPICAL COMMERCIAL RANGE OF POLYVINYL ALCOHOL

Preparation

In all applications described in this article, the polyvinyl alcohol must first be cooked with water to a temperature of approximately 190°F. to form a completely homogeneous solution and to develop fully the film-forming, colloidal, and adhesive properties. We would like to point out, however, that there are special cold water swelling types of polyvinyl alcohol now in the early commercial stages that might eventually have application for dry addition at the wet end of the paper machine.

Because of the great adhesive strength of polyvinyl alcohol, it certainly would impart increased internal strength to the paper and board if added at the wet end of the paper machine at the head box, beater or fan pump. There is little actual usage for wet end addition because of the difficult problem of retention, since polyvinyl alcohol is somewhat expensive to risk any appreciable white water losses.

Improved Surface Properties

The most important method of application for polyvinyl alcohol is by size press and tub size, which allows the deposition of a very strong, colorless, film former under well-controlled conditions. The type and amount of polyvinyl alcohol is determined by the purpose for which the size is being applied. For example, if improved grease resistance,

4,000 years B. C., slices of papyrus stalk were laboriously pressed into sheets that retained writing—so the world learned a new word: paper. Then some now-forgotten Egyptian devised a wooden roller (above) that pressed papyrus into smoother sheets, at lower cost. Result: the increased market multiplied an art into an industry.

Another milestone in paper progress: Dow Latex 512-R

Now this effective pigment binder improves dimensional stability and water resistance in coated papers—and contributes to sharper printing with fracture-free folding. Result: the highest quality coated stock with important economies. For the full story, see your Dow man. THE DOW CHEMICAL COMPANY, Midland, Michigan.

YOU CAN DEPEND ON DOW

printability and wet rub effects are desired, a high viscosity solution as well as the best film formation are necessary because we want to deposit the polyvinyl alcohol on the surface of the sheet. For this reason, the 60 cps viscosity fully hydrolyzed type polyvinyl alcohol should be used so that the film will be formed on the surface and penetration will be minimized. A solution having a concentration of three per cent to eight per cent polyvinyl alcohol solids should be used, and, in general, the temperature should be held as near as possible to room temperature. If viscosity limits are such that a 60 cps. viscosity polyvinyl alcohol is too viscous, a 51 viscosity alcohol may be used with only a slight loss in the filming properties.

Improving Internal Properties

If improved internal properties, such as mullen, tensile, etc., are desired, a low viscosity polyvinyl alcohol solution should be used so greater penetration into the sheet can be effective. The best polyvinyl alcohol for this use, again, would be the 60 cps. viscosity type, because of its greater inherent strength. (A 51 cps. or even a 30 cps. might be necessary in order to get proper penetration, at the increased solids) Here again, concentrations of between three per cent and eight per cent cover the range fairly well, and viscosity limitations determine the maximum concentration that can be used, and the viscosity type of polyvinyl alcohol required. Where penetration is desirable and necessary, it is best to use as high a temperature as possible for the size solution. For example, if a temperature up to 150°F. could be maintained, it would be very desirable.

Polyvinyl alcohol may be used in size press and tub sizing to enhance the conventional starch sizes. The addition or substitution of about one-fifth the weight of starch with polyvinyl alcohol will increase strength and filming properties of the size.

For Pigment Coatings

Polyvinyl alcohol can be used to improve the strength of ordinary pigmented coatings by using a small amount of a 60 cps. viscosity product, about 10 per cent or 12 per cent based on the starch in the binder. This gives improved strength and surface properties. If there are viscosity limitations, a lower viscosity polyvinyl alcohol may be used, such as a 51 cps. viscosity or 30 cps. viscosity, even though the strength will be a little less than with the 60 cps. viscosity type. On pigmented coatings, polyvinyl alcohol also is used as the sole binder at a level of five per cent resin solids based on the pigment. At the present time, this application has not found general usage, but the physical properties of such coatings are of definite interest.

Use in Adhesives

The usage of polyvinyl alcohol in the manufacture and application of adhesives covers a wide range of types of polyvinyl alcohol. The fully hydrolyzed 60 cps. viscosity and 51 cps. viscosity types are regularly used as a component for water resistant laminating adhesives, and bag adhesives. These grades of polyvinyl alcohol give extremely strong adhesives which meet many water resistant specifications. In addition, small quantities of polyvinyl alcohol may be added to conventional starch and dextrine adhesives to give improved strength and initial tack, except for adhesives that contain borax and compounds which gel or precipitate polyvinyl alcohol.

In all cases where polyvinyl alcohol is one of the components in an adhesive, it may be dispersed in water with other dry components such as starch and clay, and the entire system is cooked together.

THE WIGGINS TEAPE GROUP

Founded in 1761

BUTLER'S COURT, formerly part of the estate of Edmund Burke, was opened in July 1957 as the new headquarters of the WIGGINS TEAPE GROUP RESEARCH ORGANIZATION. Edmund Burke will be remembered as the British Statesman who championed the cause of American Independence during the eighteenth century. The emphasis of research in the Wiggins Teape Group is on the practical application of new processes and raw materials and improved production methods affecting the whole range of papers and paper products. Every Wiggins Teape research project is backed by the production facilities of the Group's 52 papermaking units and the experience of 200 years of papermaking skill.

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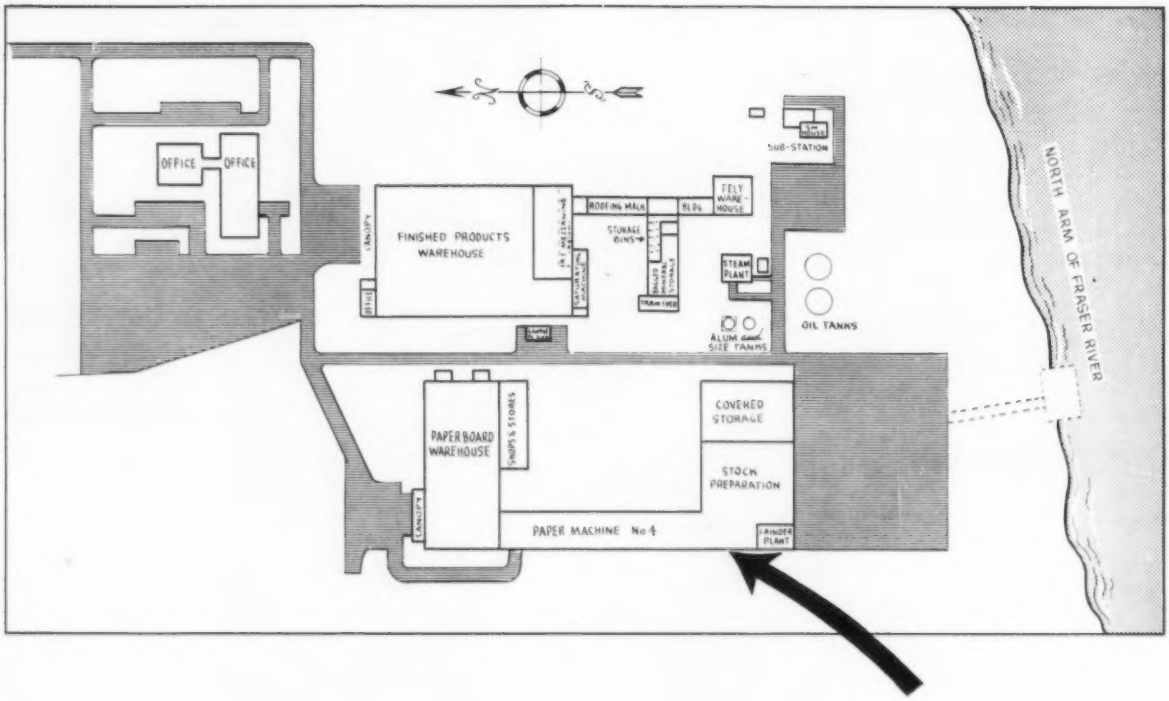


First Postwar Cylinder Machine on Canadian Pacific Coast...

. . . marks beginning of an unusual project, the complete removal of Sydney Roofing's pulp, paper and converting operations from Vancouver Island to the mainland.

R. Gordon Knight
Consulting Engineer
Vancouver, B. C.

For more than 25 years, Sidney Roofing and Paper Co. Ltd. has been operating from a site located in Victoria, Vancouver Island, B. C. Over these years, the operation has grown to include three paper machines, one saturating machine, and one asphalt roofing machine. The oldest board machine having four cylinders was installed in the early 1920's. It trims to 81 inches and produces building papers and lower grades of paperboard with production averaging 30 tons per day. The second machine is a single-cylinder one producing roofing felts, trimming to 76 inches, with production averaging 40 tons per day. The third machine has six cylinders and trims 78 inches. This machine produces higher grade paperboards.

The saturating machine produces asphalt-treated papers with average production of one ton per hour. The asphalt roofing machine produces roofing shingles and rolls with average production of ten tons per hour.

Reasons for Moving

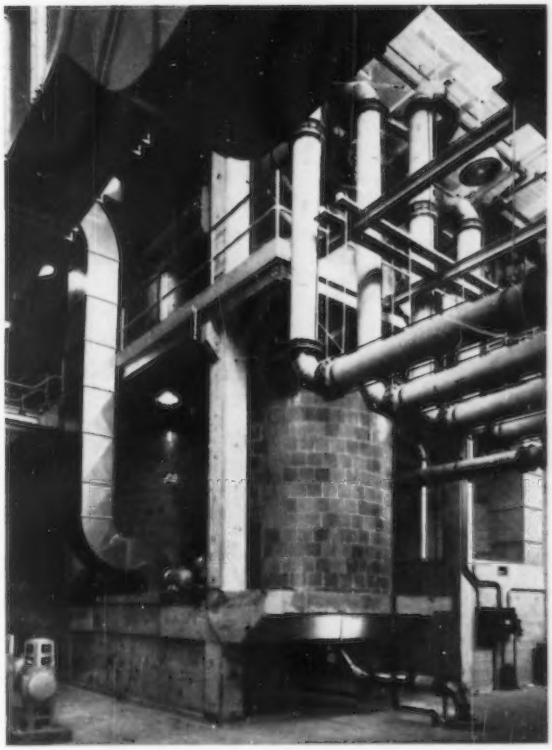
With this existing operation in Victoria, it was necessary to ship in, mainly from Vancouver 75 miles distant on the mainland, a large tonnage of waste material each month, and chemical pulps were shipped in from Harmac, Powell River and Ocean Falls. In addition, the major portion of the finished product had to be shipped back to Vancouver for distribution. As a result, transportation costs were high. A detailed economic study made in connection with the relocation indicated a possible saving of $750,000 per annum in transportation costs by operating at a new site near Vancouver. Since the company was planning to increase pro-

duction, particularly on their paperboard, additional savings were possible by relocating. Another consideration involved the usage of 20 per cent of the Greater Victoria water supply with expansion limited by dependence on this source of water.

When a market study indicated that the company should install a new cylinder board machine, an economic study made by Sandwell & Co. Ltd., consulting engineers, showed that freight savings would economically justify relocation to a site in Burnaby, near Vancouver. It also indicated other advantages such as closer proximity to markets with a possible larger share and improved service and freight rates to customers.

The integration of the company's existing subsidiary box plants in Vancouver with the manufacture of paperboard at the new site presented a logical expansion program.

For these reasons, Sidney Roofing decided to construct new paperboard facilities in the Vancouver area and later move all the existing Victoria operation to the new mill.



HYDRACYCLE TANKS follow the pulpers in the stock preparation system.

Burnaby Site

Selection of a site for the new plant was difficult due to the following specifications:

1—Room was to be provided for future expansion.

2—Transportation was to include water, road, and rail facilities.

3—The truck haul to the Vancouver area was to be short.

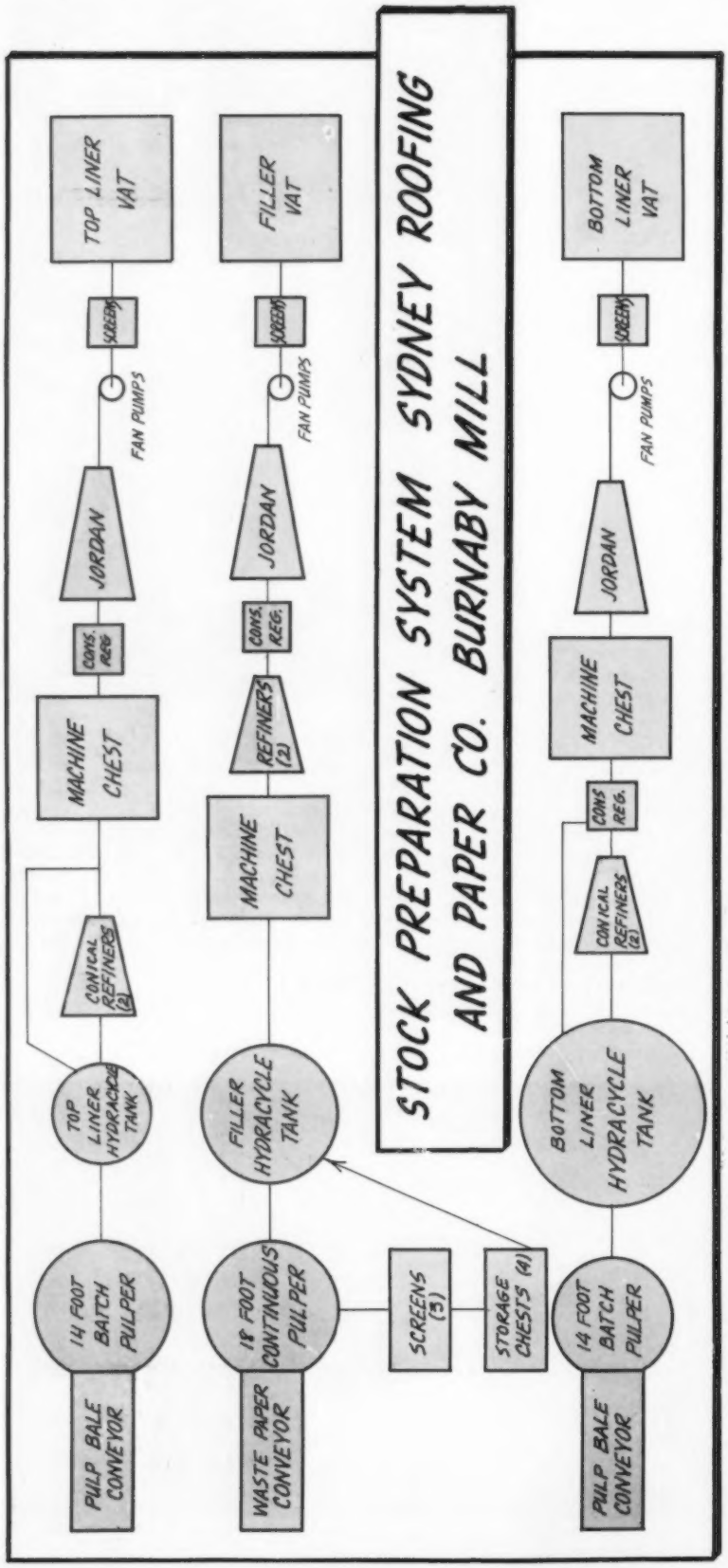
4—Proper foundations for heavy machinery were to be provided at reasonable cost.

The South Burnaby site on the north arm of the Fraser River, within a 30-minute drive of the center of Vancouver, met these specifications satisfactorily. The site was located on a portion of the flood plain of the Fraser River, and the ground level was raised five to six feet by hydraulic sand fill. Of the 75 acres acquired by the company, 23 have been raised by filling. The Municipality of Burnaby has constructed a road to the site which will eventually be hard surfaced. The Municipality also installed a special 12-inch asbestos cement water main for this project although process water will be taken from the river. Water transportation is supplied by the river while the mill spur connects with the Canadian National Railways' track which passes on the north boundary of the property.

Phase 1

Phase 1 of the development of the

CONVEYOR SYSTEM transports waste paper and chemical pulp to pulpers.



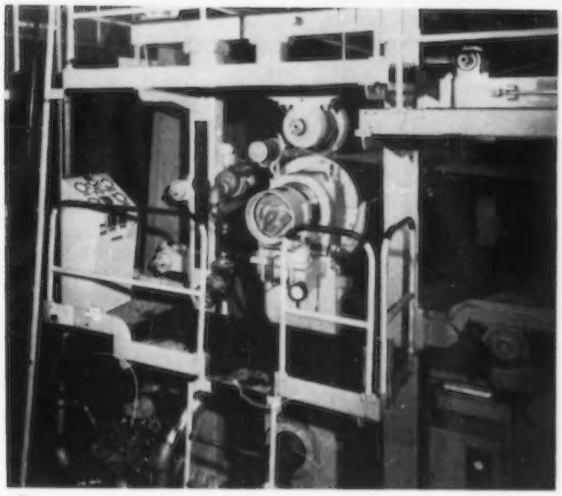
new site includes the installation of a new paper machine together with auxiliary equipment and services such as materials handling, stock preparation, shops, stores and office facilities. Design engineers for Phase 1 have been Sandwell & Co. Ltd., consulting engineers. Phase 2 will include moving the roofing plant and some paper mill equipment presently located at Victoria to the new mill.

Stock Preparation

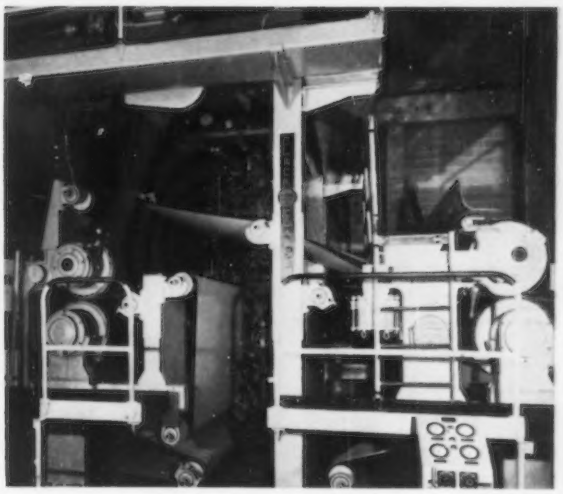
The mill itself is essentially a converting plant employing pulp from waste paper and chemical pulp to produce paper products, ranging from chip boards to fully bleached paperboards. The wastepaper and chemical pulps are conveyed from the covered storage up into one 18-foot continuous Turboflex pulper and two 14-foot batch Turboflex pulpers, all supplied by Alexander Fleck Ltd. Here the pulps are dispersed in water and may then be pumped to any of the three Hydracycle tanks for proportioning and refining. One tank holds top liner stock, one filler stock, and the other bottom liner stock. The bottom liner stock Hydracycle tank and the top liner stock Hydracycle tank are each connected to two Fibremaster refiners while the filler stock system is not. From the tanks, the prepared stocks are dumped into machine chests to be discharged under consistency control (DeZurik). The top and bottom liner stocks are treated in one jordan each, and the filler stock in two Fibremaster refiners and one jordan, before entering the Selectifier machine screens. The waste paper system consists of one 18 foot, continuous Turboflex pulper, two Classifiners, one Selectrap screen and two decks. From the deckers the pulp is discharged into any of the four waste paper supply chests from which four different types of waste paper stocks can be fed simultaneously to the Hydracycle tanks. Almost all of the large units of equipment in the stock preparation area have been supplied by Alexander Fleck Ltd. of Ottawa, Ontario. Provisions have been made for the installation of a future fourth stock system. Automatic controls have been installed for the stock preparation with remote control from a central instrument panel equipped with Foxboro instruments which also contains automatic sequence controls for preparation of Hydracycle tank batches from various waste papers or bleached pulps.

No. 4 Machine

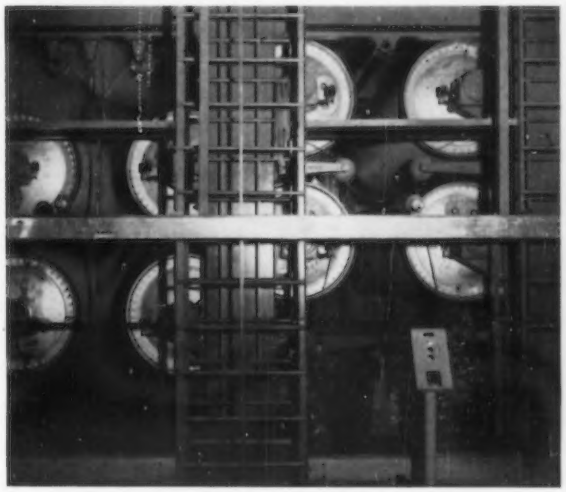
Sidney Roofing's No. 4 machine, manufactured by Black-Clawson (Canada) Ltd., is a six-vat cylinder type



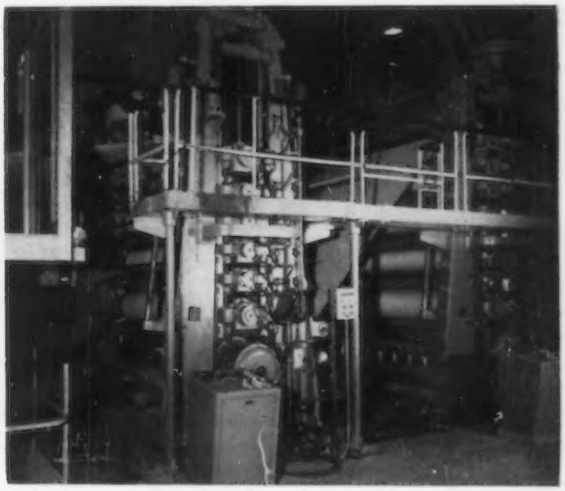
SUCTION RETURN DRUM ROLL follows sixth vat. It is 30-inch diameter x 136-inch drilled face.



SECOND AND THIRD PRESSES, like the first, are plain presses. No. 2 has a reverse run-through.



LAST 24 DRIER ROLLS are mounted on vertical columns. The design allows for future addition of drier rolls.



TWO CALENDER STACKS having nine-roll capacity each follow the drier section.

equipped to trim 120 inches, operating at 400 feet per minute. Each vat is equipped with a 42-inch diameter cylinder. The machine contains three primary presses, three main presses, 42 driers, two calender stacks, a reel, a duplex cutter and slitter, and a winder. All of the main presses have crownless press rolls. The drier section now contains 42 five-foot diameter driers with space provided for an additional 36 which can be installed with minimum interference to machine operation and without shutting down.

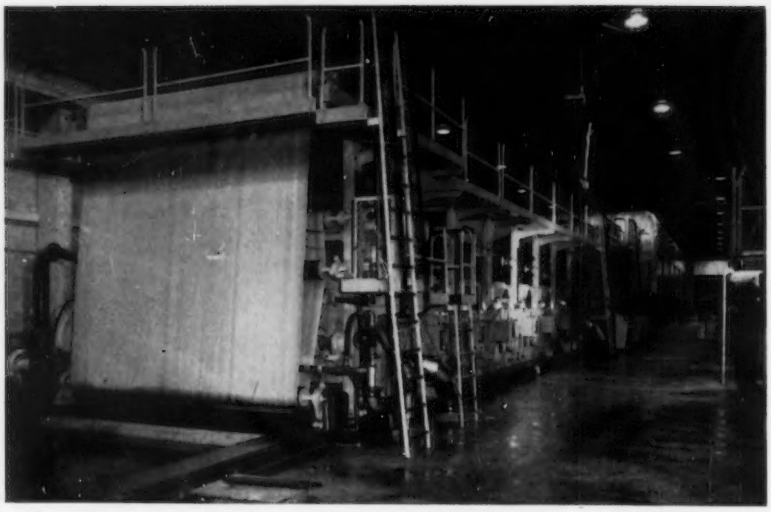
The machine is driven by a mechanical drive augmented by a sectional electric drive at the wet end, with the prime mover being a steam turbine. The drier sections are housed in an open hood equipped with exhaust fans designed for the future addition of high velocity air nozzles.

Two calender stacks each of nine-roll capacity follow the drier section. The calendered sheet then goes either to a sheet cutter or a drum type reel capable of reeling paper for 72-inch diameter finished rolls. The Duplex sheet cutter handles the cutting into rectangular sheets, of paperboard according to customer orders. The sheets are then stacked on skids which when completed are wrapped and banded for shipment. The roll winder is a two-drum unit equipped to wind to 72 inches diameter, including slitting equipment for required widths. The entire paper machine, including the reels, sheet cutter and roll winder, has been supplied by Black-Clawson (Canada) Ltd. of Montreal.

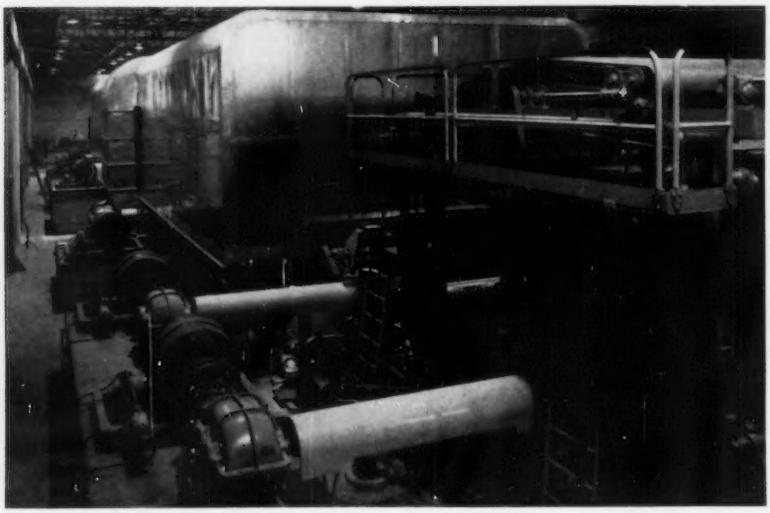
The paper machine auxiliaries include a disc-type saveall (Dorr Oliver), a 12-foot diameter broke pulper with conveyor system, and six enclosed type machine screens.

Water

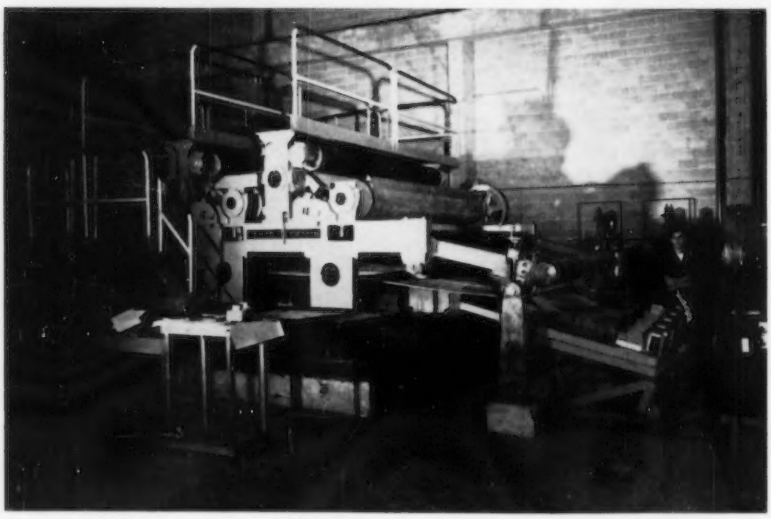
Besides the 12-inch main laid to the plant by the Municipality, a water treatment plant of Northwest Filter Co. design with Wallace & Tiernan chlorinator and chemical feeder has been installed with capacity of 3,600 gallons per minute. The intake in the Fraser River consists of a floating platform



SIX CYLINDER MACHINE operates up to 400 ft. per min. Trims 120 inches.



MECHANICAL DRIVE is augmented by sectional electric drive at wet end.



DUPLEX CUTTER AND SLITTER handles all production that is not shipped as rolls.

which rises and falls with the river level. Centrifugal pumps are mounted on this and through a header are connected to flexible hoses to another header on the shore and then to the treatment plant. Water requirements for No. 4 machine are seven million gallons per day. This amounts to 200 tons of water for every ton of paper produced. Most of this water will be recirculated and used again with the exception of one million gallons per day which will be discharged into the river through a 30-inch pipe extending 100 feet out from the bank to a point 14 feet below low tide.

Plant Buildings

A full description of the plant will not be given since the construction of other phases is not yet completed. However, the boiler plant consists of a 40,000-pounds-per-hour Fyr-Compak package type natural gas-oil fired boiler housed in a steel-frame building with corrugated asbestos siding and precast concrete roof. The steam plant will normally use natural gas recently piped into Vancouver from the Peace River area but can be switched to fuel oil when gas supplies are limited. The finished products from the paper machine are to be stored in a finished products warehouse, 120 feet by 260 feet, and shipped from here by truck or rail cars. A new office building of unique design is being constructed by John Laing & Son (Canada) Ltd. This new administration headquarters consists of two separate buildings joined by a covered "bridge" at second story level.

Schedule

The construction schedule for the first development stage called for the start-up of the plant in the fall of 1957. Although the contract with John Laing & Son is not yet complete, the first production on No. 4 machine was made on November 4, and the product run was dissolving core stock. Previous to this, several trial runs had been made on other products to test the capabilities of the new machine. The official opening is scheduled for mid-February 1958.

Personnel

Comprehensive training programs have been undertaken to acquaint the Victoria employees with the new equipment. Lectures given by Black-Clawson Co. and Alexander Fleck Co. were followed by practical training and dry runs on No. 4 machine, all under the guidance of T. N. Finical, vice president, manufacturing. Public and industrial relations are being ably handled by Dean Miller, public relations consultant to Sidney Roofing. W. R. Murray is mill manager.

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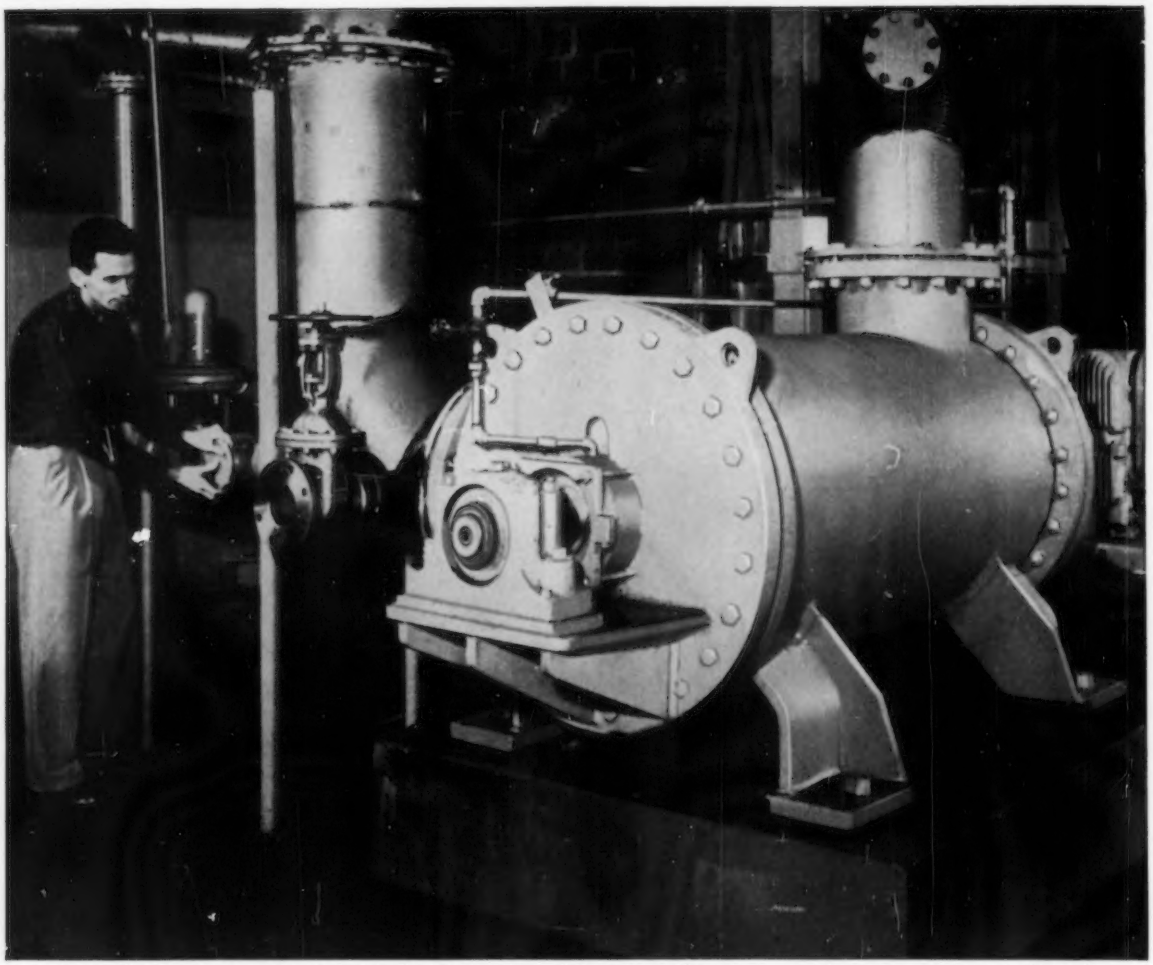

Chlorine dioxide mixer in service at the Carolina Division of Riegel Paper Corp. The unit was manufactured by Improved Machinery Inc. It is lined with ⅛" REM-CRU A-70 titanium sheet.

TITANIUM tames chlorine dioxide bleach

Improved whiteness and reduced fibre degradation—they're the benefits of bleaching with chlorine dioxide. But this fine bleach is also a strong corrosive—it's been known to ruin even very special alloys in five hours.

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Titanium's unique properties can help solve other pulp and paper mill materials problems, too. It's strong as steel, for example, yet 44% lighter . . . it withstands attack by an extremely diverse group of corrosive media . . . it is immune to stress-corrosion cracking . . . it is not subject to cavitation corrosion and erosion.

No wonder titanium outlasts other materials by as much as 10, 20, even 50 times! Though titanium equipment may cost two or three times more than that made from other materials—*titanium's longer service life rapidly wipes out this cost differential.*

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Write Dept. PT 12 for the Rem-Cru Review—a free periodical presenting the latest data on titanium.

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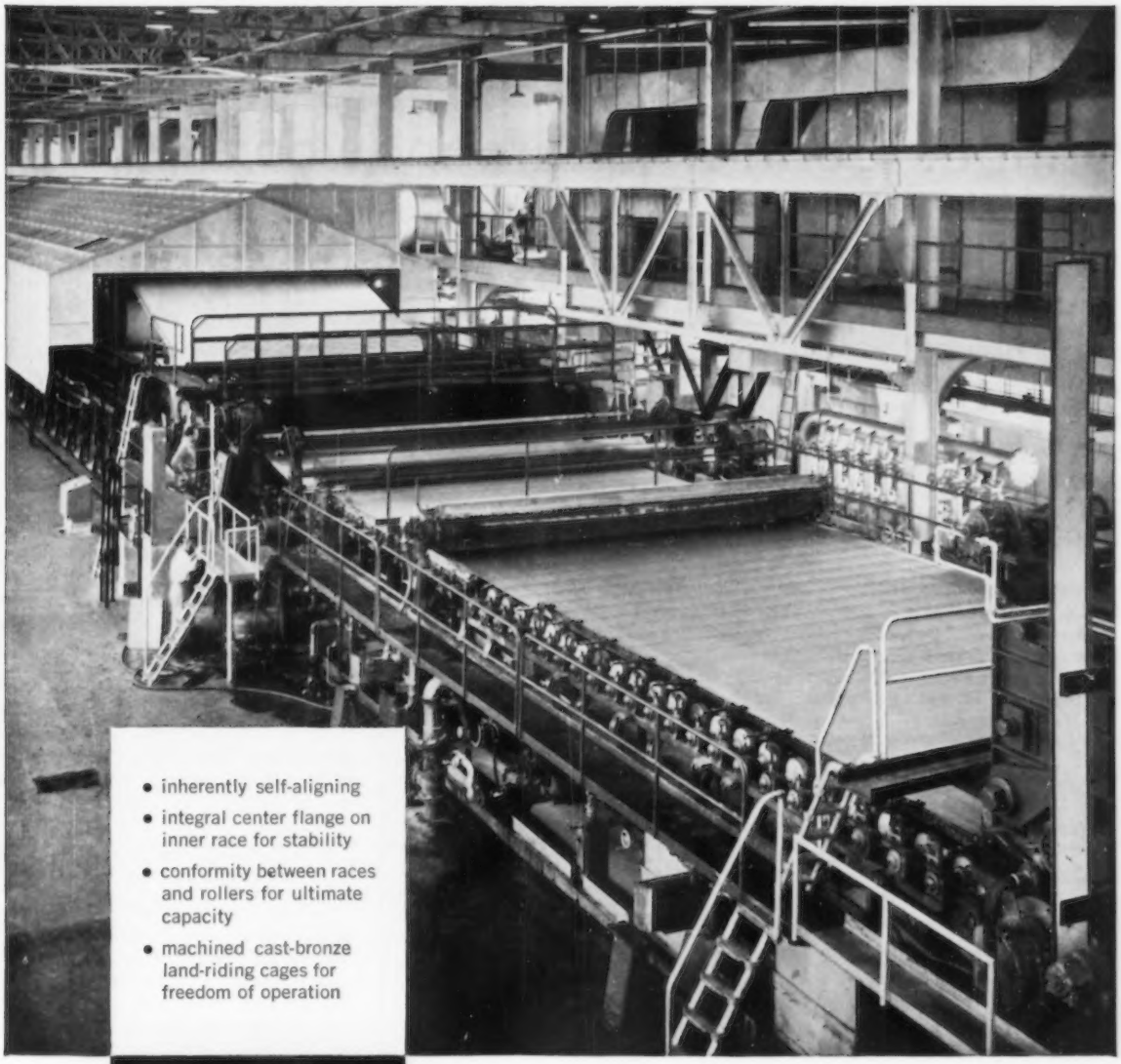

- inherently self-aligning
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A New World's Record!

World's record on 50# Kraft bag paper—2,200 fpm—is held by this 232-inch paper machine built by Beloit Iron Works for St. Regis Paper Company at Jacksonville, Florida.

Contributing to this performance are 718 Torrington Spherical Roller Bearings on wire rolls, press felt rolls, top press rolls, paper and felt driers and idlers, calenders, suction couch and press rolls, reels and winders. Inherently self-aligning, these bearings compensate for shaft deflection across the machine and eliminate need for periodic realignment.

Torrington Spherical Roller Bearings are available from stock with straight or tapered bores for shaft or adapter mounting. When you are counting on production, count on Torrington Spherical Roller Bearings for smoother, faster, more economical service from wet end to winder. *The Torrington Company*, South Bend 21, Ind.—and Torrington, Conn.

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Number 20 in our extensive series on groundwood production . . .

Grinder Control in Groundwood Pulp Manufacture

Dr. K. H. Klemm
Manager, München Dachauer Papier Fabriken
Munich, Germany

English text by
G. P. Chinn

Control of the grinders must be based on the results of groundwood testing and should not be dictated by the production because then it is not possible to pay attention to the quality requirements to the full extent. Earlier (Routine control in groundwood mills), reference was made to the statistical evaluation of a questionnaire comprising 29 Canadian groundwood mills (Table I). As was mentioned then, the conclusions drawn from such questionnaires must be analyzed critically* with regard to the special conditions prevailing. However, Table I permits a good survey of the methods used in practice for grinder control.

* Edwards (2), already in 1938, mentioned the influence of sharpening on the temperature in the grinding zone.

TABLE I—FREQUENCY OF THE METHODS USED FOR GRINDER CONTROL IN CANADIAN NEWSPRINT MILLS#

Method Used for Grinder Control	Percentage of Mills Regularly Using	Percentage of Mills Periodically Using
Individual Grinders		
By Sharpening	100.0	0.0
Grinder-pit Temperature	79.4	17.3
Load	55.2	7.0
Grinding Pressure	51.7	17.3
White-water Temperature	51.7	13.8
Grinder-pit Consistency	44.9	38.0
Stone Surface by Dulling	34.6	65.6
Submergence of Stone	27.8	31.0
Traveling Rate of Wood	20.7	3.5
Depth of Sharpening	3.5	48.3
R.p.m. of Stone	3.5	0.0
Kind of Burr	—	34.5
Kind of Pulpstone	—	20.7
Stone Surface by Brushing	—	13.8
Stone Diameter	—	7.0
Change in Whole Grinder Room		
Sharpening Intervals	24.2	20.7
Total Load	13.8	3.5
Wood Type	10.6	31.0
Wood Moisture	3.5	10.6
Wood Diameter	—	10.6
During Stock Preparation		
Mixing of Various Pulps	27.8	3.5
Change of Amount of Recovered Rejects Added	20.7	0.0
Reject System	13.8	20.7
Refining	10.6	20.7
Screening System	10.6	13.8
Classified Screening	7.0	13.8

From a survey made by the Mechanical Pulping Committee, Technical Section, Canadian Pulp and Paper Association which covered 29 Canadian groundwood mills.

* The table shows, for example, grinder-pit temperature, grinder-pit consistency and white-water temperature separately but these variables are closely related and a change in one results in a change of at least one of the others. This is also true of load, traveling rate of wood and grinding pressure.

Possibilities for Grinder Control

Taking into consideration the interrelationships mentioned in the footnote to Table I, the following possibilities for grinder control are given in the order of their importance:

a—Change of the stone surface by sharpening.

b—Change of load, grinding pressure or traveling rate of wood.

c—Change of grinder-pit temperature, consistency and/or shower white water temperature.

d—Change of stone surface by dulling.

e—Change of sharpening pattern, or brushing of the stone surface.

f—Change of stone submergence.

g—Change of sharpening interval.

h—Change of the wood.

In addition, several mills achieve certain effects by mixing the accepted stock of different screening stages. Over a much longer time interval, it is possible to alter the groundwood quality by changing the size and composition of the pulpstones. Which of these control methods can be used depends, to some extent, on the grinder type and the end use of the groundwood. It is very difficult, therefore, to survey all possibilities and the following discussion can only provide a general picture and indicate roughly the direction.

Quality Control by Stone Sharpening

Sharpening of the stones is the most frequent and most effective means of in-

TABLE II—CHANGES IN GROUNDWOOD QUALITY DURING ONE SHARPENING INTERVAL

Changes at Constant Load	After Sharpening	Self-Conditioning Period	Main Period	Slow-down Period
Production	Large increase	Small decrease	Further slight decrease	Large decrease
Specific Energy Consumption	Large decrease	Slight increase	Further slight increase	Rapid increase
Freeness	Large increase	Further small increase or remains constant	Starts to decrease	Large decrease
Strength Properties (In general)	Very low	Increase	Further increase	Remain constant or decrease
Technological Explanation (See footnotes)	(1)	(2)	(3)	(4)

(1) During defibering, cutting action prevails and at the same time, the temperature in the grinding zone drops. The groundwood shows the typical characteristics of cold groundwood: short, stiff fibers and a high percentage of flour-like fines.

(2) The cutting action becomes slowly replaced by refining action, the temperature in the grinding zone increases slowly, the fibers become longer and more flexible, and the percentage of fines decreases but, at the same time, their structure is slowly changed from flour to fibrilplasma.

(3) The temperature in the grinding zone reaches the optimum and, with this, optimum conditions for defibering and refining prevail. The fibers are flexible and well fibrillated and the structure of the fines is prevailingly fibrilplasma.

(4) With the dulling of the stone and the decrease of the volume of the stone surface cavities, the increase of the secondary grinding factor, the refining action, becomes too intensive. More and more fibrilplasma is produced which decreases the freeness very much and a new sharpening of the stone becomes necessary.

fluencing groundwood quality and must be used to counteract the wearing down of the surface during grinding. However, sharpening always results in a more or less pronounced drop in the quality of the groundwood, the amount being dependent on the "art" of the stone sharpener. As discussed in an earlier part, the quality of the groundwood is dependent upon the conditions at the grinding surface and the volume of the stone cavities. With reference to the theory of Brown (1), the following concepts may be useful for picturing the effect. When the surface structure of the stone is changed by sharpening, a sharp drop of groundwood quality occurs. The refining action is replaced by a cutting action and the temperature in the grinding zone drops*. The groundwood shows typical characteristics for cold grinding: short, stiff and cut fibers and flour-like fines. The refining action is decreased because sharpening increases the volume of the surface cavities. However, if the sharpening changes only the volume of the cavities and not the refining area, only minor changes in the quality of the groundwood result. Strength properties decrease in this case too but not considerably more than equivalent to the rise of freeness and, therefore, the relative quality of the groundwood is maintained.

This effect is, however, difficult to achieve. With frequent sharpening, the depth of the furrows increase faster than the ridges wear down and the refining area of the surface must be affected. On the other hand, if the ridges wear down faster than the furrows are deepened, the stone surface pattern is lost and the burr, without a guide, may superimpose a new pattern on what is left of the old. The grinding effect will be greatly influenced. It is essential, therefore, to choose the right relationship between sharpening frequency and sharpening depth. As the rate of wear of the stone is dependent upon the stone composition, wood conditions and the load applied, the sharpening interval cannot be fixed systematically but must be decided for each stone separately. Tests which help to indicate the correct time to sharpen are the specific energy consumption or the Sharpness Number at the individual grinders as well as a visual examination of the pulp from each. With regard to the specific energy consumption, as a rough rule, a stone must be sharpened if this is 35 per cent higher than normal with a low load, 30 per cent higher with average load and 25 per cent higher with high load.

The sharpening interval also depends upon the intensity of the individual sharpenings which must be governed by the type of stone and the type of burr used. Basically, it is more favorable for average groundwood quality if the freeness desired is achieved with as few sharpenings as possible. That means, if the individual sharpenings are as intensive as possible with regard to the type of stone and the type of burr. As a rough rule, a minimum sharpening interval should be 90 hours for vitrified bond stones and 16 hours with cement bond stones.

The freeness of the composite groundwood or the specific energy consumption for the whole grinder room may be used as a guide for setting the intensity of the sharpening and the sharpening interval. If only white water is used for dilution in the grinder pit, flumes and coarse screens, the Sharpness Number for the whole room can also give a good indication. Generally, in North American groundwood mills, the limits set for the pulp freeness are much narrower than drawn in European mills. Keeping within narrow limits is, of course, easier in mills which have a large number of stones. It is important, especially in small mills, that sharpenings be evenly distributed with respect to time. To sharpen several stones at the same time is more and more detrimental the smaller the number of grinders which contribute to the production. Many mills, therefore, set a maximum number of stones which can be sharpened during any one shift and this number can only be exceeded in special cases. Correct distribution of sharpenings is easier to determine if a survey is made of all data which characterizes the particular stones and their reaction to the stone treatments.

It may be mentioned that these concepts related to the sharpening of stones are not generally accepted. The opinion is common in many mills that a more uniform groundwood quality can be held by more frequent sharpenings. This may be correct with regard to the ease of achieving a constant quality but, at the same time, a constant low quality. It must be realized that groundwood quality is subject to considerable change during one sharpening interval. According to a proposal by Klemm (3) (4), it is useful to divide one interval into a self-conditioning period, the main period and the slow-down period. The development of groundwood qualities during these periods is explained in Table II.

The length of time of these different periods varies. The *self-conditioning period* may account for twenty-five per cent of the length of a normal sharpening interval. The *main period* comprises about one half the sharpening interval and may be characterized by the freeness not showing a difference of more than $\pm$ 8 (Canadian Standard) from the average desired. The last 25 per cent, then, represents the *slow-down period*. This is, however, only a rough indication. In practice, the combined main and slow-down periods should cover as high a percentage of the interval between two sharpenings as possible (4). According to this concept, as mentioned previously, frequent sharpenings

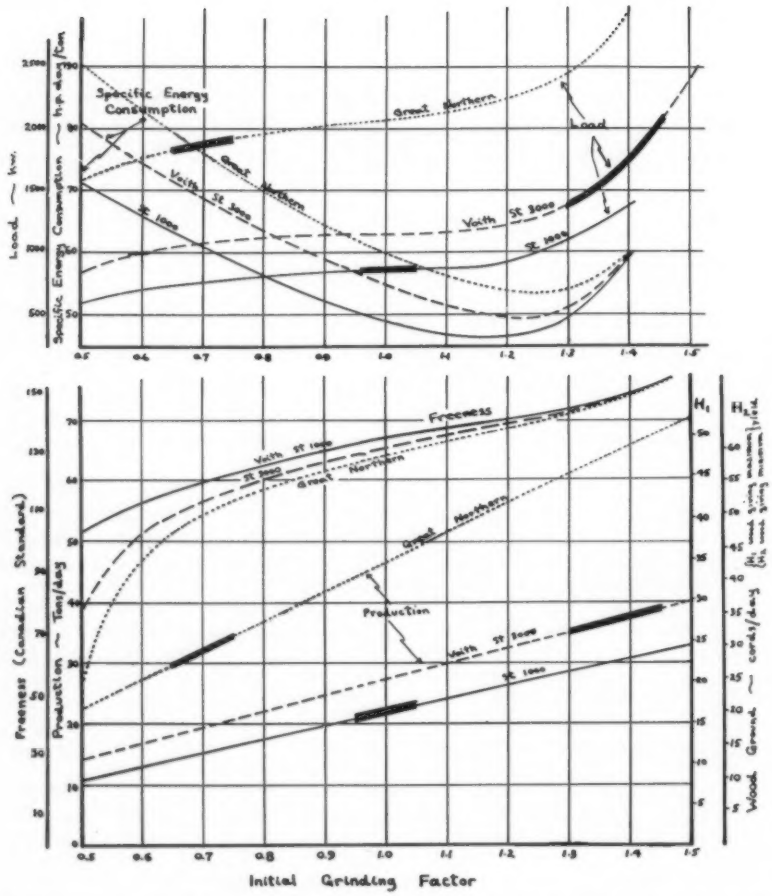

FIGURE 1—RELATIONSHIP BETWEEN INITIAL GRINDING FACTOR AND LOAD (for different grinder types)

can only decrease the average quality of the groundwood produced. Optimum overall quality should result if the stone sharpenings are adjusted such that the lower quality made during the self-conditioning period of one stone is compensated by above average production of favorable structural elements from dull stones. This, however, requires more skill and considerable precaution. To further increase the average quality, Collicut (5) has indicated that the load should be adjusted according to the condition of the stone surface. This will be discussed later in the section on grinder load.

The effect of the sharpenings should be checked by a visual examination of the pulp or other suitable methods such as the traveling rate of the wood, the specific energy consumption or the Sharpness Number. It may happen that the sharpening is not effective. In this case, the fact that the stone has been sharpened is not sufficient and it must be repeated. Checking the result of sharpenings is particularly important for the self-education of the operators, to provide a control on the sharpenings and for the selection of operators who have special sharpening skill. The latter is the most important as sharpening, up to the present time, must be considered as an art.

Control of the sharpenings is difficult as the effect does not show up immediately but, with favorable sharpenings and vitrified bond stones, only after several hours. It is necessary, therefore, to follow the quality development after sharpening for a considerable period (several hours). Another danger which must be watched with regard to the composite room stock is that, if too many stones are sharpened, after a period of time, the room freeness will suddenly increase. It is essential, therefore, to allow a certain delay between stone treatments.

TABLE III—EFFECT OF BURR PATTERN ON GRINDER OPERATION

Kind of Burr	Needle	Needle	Diagonal	Diagonal	Needle
Average Depth of Sharpening—mm. ...	0.29	0.42	0.53	0.57	1.02
Final Grinding Factor	0.150	0.124	0.104	0.097	0.061
Freeness of Pulp (Canadian Standard) ...	130	145	150	158	210

Change of Production Rate for Quality Control

In addition to sharpening, the Initial Grinding Factor influences the quality of the groundwood. For any one grinder type, it is indicated by the load, the grinding pressure or the wood consumption, but changes with change of wood quality. The use of the Initial Grinding Factor is more advantageous than the load, grinding pressure or wood consumption individually as it includes all these variables and also provides comparable data for any grinder type[1] and any wood species. Figure 1 shows the relationship between the Initial Grinding Factor and load, production and freeness at a normal stone condition for different types of grinders. It can be seen that at the same Initial Grinding Factor the production is different with each grinder type. The remarkable thing is, however, that the freeness of the groundwood produced on the different grinder types is approximately the same at the same Initial Grinding Factor.[2] With the same wood, the rate of wood consumption is, of course, equivalent to the production but this can be changed considerably with a change of wood quality as shown on the right-hand scale. The production is not proportional, but increases more slowly than the load at an Initial Grinding Factor higher than 1.3 and, therefore, the specific energy consumption increases despite the further freeness increase.

Figure 2 shows these facts more clearly. Here, production and specific energy consumption are plotted against freeness. It can be seen that the specific energy consumption increases rapidly if the Initial Grinding Factor of 1.3 is surpassed. An explanation may be that

[1] With the use of the Initial Grinding Factor, for example, the fact can be explained that the limit for the increase of the specific energy consumption, despite increasing freeness, appears at about 60 tons/day with Great Northern grinders, 24 tons/day with Voith St 1000 chain grinders and 33 tons/day with the St 3000 chain grinders.

[2] At the same length of grinding zone, the freeness should be identical at the same Initial Grinding Factor. The differences shown in Figure 1 are related to the length of the grinding zone which is 39.3 in. with the St 1000, 51 in. with the St 3000 and 2 x 36 in. with the Great Northern grinders.

with the stone surface being constant, the final grinding factor increases with increasing production and the energy used for refining increases. These facts are important insofar as they indicate that there must be an optimum load for the production of a given freeness for each grinder type. If the desired freeness is lower than appropriate to the load used, it is necessary to operate the grinder with a very dull stone surface. The specific energy consumption is then considerably increased over that which would result from the correct load. This is further explained by Figure 3 where the specific energy consumption and load are plotted against freeness for different stone sharpnesses at the same grinder. Whereas the discussion so far was related to a normal stone surface and indicated, therefore, the average conditions which can be expected during one sharpening interval, these relationships at three different stone conditions (sharp, normal and dull) are shown. A close examination reveals some very interesting information. At very low load, as the load is decreased, the influence of the stone surface becomes less and less. This can be seen from the production and tensile at the same freeness remaining relatively constant while the specific energy consumption becomes more and more differentiated by the condition of the stone surface. On the contrary, with very high loads, the specific energy consumption at the same freeness approaches a constant for all stone conditions while the tensile and production become more and more spread. These facts may be more interesting from a theoretical point of view and certainly should warrant further research work. However, the knowledge of these relationships should be useful for practical operation too.

In this respect, the question of load at different stone conditions is especially important. It can be seen from the graph in Figure 3 that the results obtained with high load on dull stones compares very favorably with high load on sharp stones without very much difference in the specific energy consumption. If the production of a grinder has to be increased by increasing the load, it seems to be favorable to vary the load according to the condition of the stone surface. With this, it should be possible to increase the average production without change of quality or specific energy consumption. If capacity is not the limiting factor, there should be an advantage from using low load on sharp stones and high load on dull stones. This principle, however, requires that the drives have sufficient capacity and that certain precautions are taken to keep the total load in the grinder room within the range required

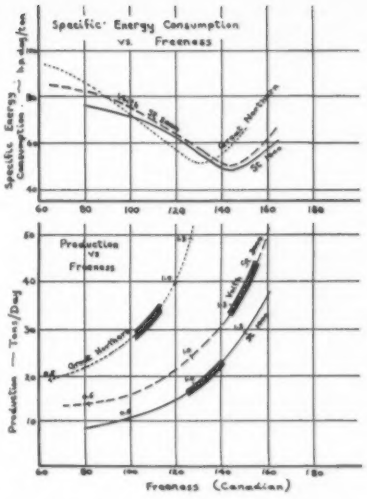

FIGURE 2 — RELATIONSHIP BETWEEN LOAD AND FREENESS FOR SIMILAR STONE CONDITIONS (for different grinder types).

by the practical operation of the whole mill. In addition, this practice would enable a considerable increase of the sharpening intervals which should effect, indirectly, an increase in the quality of the groundwood.

Grinder Control by Change of Grinder-Pit Conditions

According to Table I, changing the grinder-pit temperature, grinder-pit consistency and/or the shower whitewater temperature is another important method used for controlling the groundwood quality. It has already been emphasized that the temperature and consistency are directly related to each other. At the same white-water temperature, an increase of grinder-pit temperature is possible only by increasing the grinder-pit consistency. Different investigators (6) found that the influence of temperature and consistency are inversely proportional and the favorable influence of higher temperature becomes eliminated by the unfavorable influence of higher consistency. As was shown by Brecht, these superimposed influences are not the same at different stone conditions. However, if it is possible to increase the temperature in the grinder pit and maintain the same or lower consistency (possible with higher whitewater temperature), both economic and technological advantages result (7) (8). At the same load, the freeness increases with higher temperatures in the grinder pit. If the freeness must be held constant, the load must be decreased. Even then, the production remains the same and groundwood with higher strengths and a greater percentage of long fibers results. According to Klemm (7), an increase of 10° F. in the whitewater temperature is related to a decrease in the specific energy consumption in the range of two to three per cent. The question of low consistency, hot grinding, therefore, is of considerable interest and recent experience indicates that the use of steam to increase and/or control the white-water temperature pays off. It must be considered, however, that the grinder-pit temperature must be chosen also with regard to wood quality (Figure 4). With wet wood, extremely high temperatures can be used to achieve optimum results. With dry wood, the pit temperature should not be higher than about 170° F. Over age wood with decay should not be ground with temperatures above 140° F.

Grinder Control by Stone Dulling

Table I indicates that dulling is a method of stone treatment less frequently used and then mostly in special cases. In fact, a frequent dulling of the stones in a groundwood mill indicates that the sharpenings are not done correctly or that other methods to adjust groundwood quality are not prac-

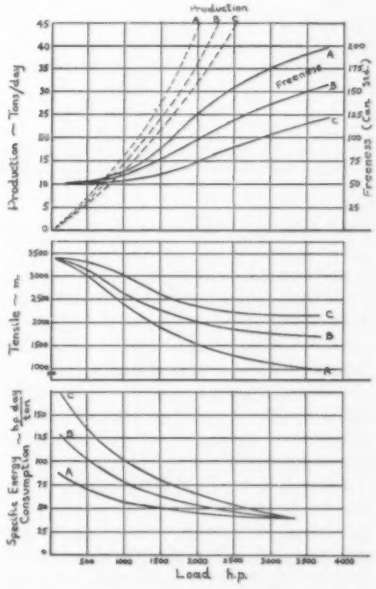

FIGURE 3 — RELATIONSHIP BETWEEN LOAD AND FREENESS FOR DIFFERENT STONE SURFACE CONDITIONS

A—Sharp stone; B—Normal stone; C—Dull stone. (The above figures were obtained on a Great Northern Grinder fitted with a vitrified bond stone and grinding floated wood).

TABLE IV—THE COMPENSATIONS POSSIBLE FOR CHANGES IN WOOD QUALITY DURING GRINDING

Property Deviating from Normal Wood Quality	Compensate by Change of		Effect on Specific Energy Consumption	Effect on Groundwood Quality
	Load	Sharpness of Stone		
Moisture Content	To maintain quality with higher moisture content, use higher loads and vice versa.	To maintain freeness: duller stones with higher moisture content, sharper stones with lower moisture content	As a result of change in production rate, specific energy increases with higher moisture content, decreases with dry wood	At the same freeness, wood with high moisture content results in more favorable strength properties
Density	To maintain quality: lower load with higher density, higher load with lower density	To maintain freeness: sharper stones with higher density and vice versa	If sharpness and load are changed, only slight changes in specific energy consumption as production remains about the same	At the same freeness, quality is higher with low density wood
Percentage of Knots	No general compensations possible. The effects are less pronounced with lower than with higher loads. The stones dull faster as the wood knot content increases.		Increases with higher percentage of knots with, at the same time, a decrease of production	With higher percentage of knots, strength properties decrease while percentage of fines (flour-like) increases
Diameter and Shape	No general compensation is necessary. However, it must be realized that the production (as indicated with wood recorders) "seems to increase" with decreasing wood diameter and to decrease with greater wood diameter		As with wood measurement, it "seems" to decrease with smaller wood diameter and to increase with greater wood diameter	Wood with average diameter is most favorable. If the percentage of heart wood (as with increasing diameter) increases, the strength properties decrease

ticed in this particular mill. In this regard, special kinds of dulling, such as a soft treatment of the stone surface after sharpening, may be excepted. This is done in some groundwood mills in order to shorten the self-conditioning period of the sharpening interval. As far as is known, no definite advantages could be observed. The principle, however, seems to be correct and should be investigated further.

In special cases, dulling of the stone may be acceptable (i.e. if the wood quality changes rapidly and all other methods are not sufficient to compensate for it, or if a sharpening was extremely effective, as does happen from time to time). Dulling of cement bond stones should be done with brick, and special dulling stones should be used for vitrified bond pulpstones. The use of diamond burrs for this purpose is not recommended. If a stone continues to show unfavorable groundwood quality, it is generally advisable to remove the sharpening pattern completely and then to put on a new pattern by a normal sharpening.

Control by Changing Burr Pattern or by Brushing

The most important burrs used at present have already been discussed. At that time, it was emphasized that the influence of the sharpening pattern is smaller than generally has been believed (9). Depending upon the sharpening techniques used, the composition of the stones and the characteristics of the wood available, however, one kind of burr may prove more suitable than another in any one mill. Standard compensations for change in wood conditions can be made by changing the burrs as, for example, when the yard switches from floated wood to piled wood if the wood supply is dependent upon the season. However, frequent changes of the type of burr should be avoided and the same burr should always be used at the same stone.

Basically, with each burr type, any groundwood quality can be produced if the relationship between refining and open area of the stone surface is chosen correctly. It is difficult, however, to achieve the right depth of the sharpening, as small differences may result in relatively large changes. With an increasing depth of sharpening, the freeness of the pulp increases. The measurements in Table III were obtained under actual operating conditions.

From the table above, it would seem to be easier and more practical to alter the over-all quality by changing the depth of sharpening rather than the sharpening pattern. The following advice is only an approximation: Changes in the conditions which require more refining action (such as wood with higher moisture content) can be compensated for by changing to finer burrs. On the other hand, the type of burr should harmonize with the composition of the pulpstone. With regard to holding the sharpening pattern, it seems advisable to use coarser burrs with coarse grit stones than with fine grit stones.

In recent years several mills have recommended that the stone surface should be treated periodically with a steel brush. However, no definite results of this practice are known and from a theoretical point of view, this may only be advantageous where the shower water pressure is too low or the shower pipes are not arranged for effective action.

Grinder Control by Changing Stone Submergence

The question of submergence of the stones or, in other terms, the depth of stock held in the pit, has been investigated at different mills with widely differing results. Without doubt, the influence of submergence of the stone must be considered in relation to the consistency in the grinder-pit and the stone surface speed. The effect of submergence is related to the amount of regrinding involved. Recently, pitless grinding was tried and the experience with it may be useful in this discussion. With pitless grinding, the height of stock in the grinder pit is decreased to the point where the stone is no longer submerged. When doing this, it is necessary to increase the shower water pressure considerably and this indicates that the depth of submergence must be related to the cleaning of the stone surface. With normal working conditions, a considerable amount of regrinding occurs,[1] and, as the amount of this increases, the freeness decreases. Higher consistency or greater submergence of the stone results in more regrinding and, therefore, a freeness decrease. With pitless grinding, the high shower water pressure applied (at least 50 p.s.i.) effectively cleans the stone sur-

[1] On the average, the amount of reground stock is in the range of 15-25 per cent of the production. However, in special cases, it can be considerably higher.

face. Compared with normal operation, a considerable increase of the freeness must be expected and with this, a decrease in the specific energy consumption. However, if the same freeness has to be maintained, stones with finer grits and relatively dull surfaces must be used. If freeness and groundwood quality must be maintained, no savings from a lower specific energy consumption can be expected. The advantage of pitless grinding, therefore, can only be to improve the control of the grinding process because the influence of the variables; stone submergence, consistency in the grinder pit and temperature in the grinder pit are eliminated.

Grinder Control by Changing Sharpening Interval

The importance of the time interval between sharpenings has already been discussed. It is not advisable to fix a definite interval for the individual stones although mills having a large number of stones do fix the number to be sharpened each shift. Any change of these limits, of course, influences the average length of the sharpening interval and, therefore, a certain amount of control of groundwood quality can be achieved in this way.

Grinder Control by Changing Wood

As has already been discussed, the properties of the wood (10) have a major effect on groundwood quality. Of course, the quality of the wood available generally cannot be changed. The fact that this point is mentioned in Table I indicates, however, that even the restricted possibilities which are available in the woodyard can be used to advantage.

The composition of the stones, type of burr, sharpening technique and load applied are purposely or empirically chosen to obtain the desired groundwood quality with the wood available. In general, for the grinding of wood having a low moisture content (below w_f = 25 per cent) coarser grit stones and coarser burrs are more favorable and the grinders should be operated with lower loads than used for wood with a moisture content above 35 per cent. Experience has also indicated that vitrified bond stones are less suitable for grinding dry wood than cement bond stones. With wood having a high moisture content, both types of stones produce very similar groundwood quality. To attain the same freeness, a higher specific energy consumption is required with wood having a high moisture content but, at the same time, the strength properties of the pulp are better. In general, it is not possible to achieve as high a groundwood quality with dry wood and, therefore, with few exceptions, dry wood is less suited than wet wood for groundwood production. Wood species with thick fibers can be ground with higher loads than those with smaller fiber diameters. However, to obtain the same freeness, a high specific energy consumption is necessary and the stone surface must be relatively dull. Only low quality groundwood can be produced from hardwoods (e.g. poplar), and optimum strength properties result from low loads on relatively dull stones.

Deviations from normal wood quality such as the wood moisture (11), percentage of knots (12), density (13) or the change in the ratio between springwood and summerwood (14) influence the groundwood quality or energy consumption and must be compensated for by changing the grinding conditions. This is difficult, especially if the changes occur frequently and quickly. It is most important to try to eliminate sudden major changes before the wood is delivered to the groundwood mill. This must be done in the woodyard or even in the forebay. Wood quality fluctuations, without doubt, cause considerable production losses in most mills.

It is not possible, of course, to avoid all changes of wood quality. Mills where wood delivery depends upon the season or, as in Europe, where the wood is stored for varying lengths of time in the forest, cannot avoid variations in the wood moisture content. In Table IV some rough recommendations are given as to how compensations for changes in wood quality can be achieved.

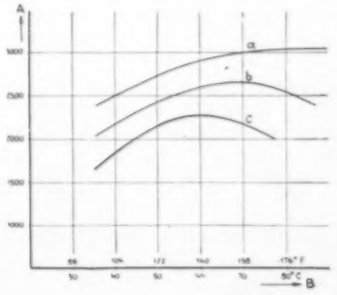

FIGURE 4 — INFLUENCE OF GRINDER-PIT TEMPERATURE WITH DIFFERENT WOOD CONDITIONS (valid for grinder-pit consistencies of 1.5 to 2.5% and groundwood freeness [Canadian Standard] of 115 to 140).

A — Tensile strength, m.; B — Grinder-pit temperature in °C and °F.

a—Wet wood (w_f above 35%); b—Dry wood (w_f around 18%); c—Old wood badly decayed.

Conclusion

The foregoing indicates that the training and the reliability of the groundwood mill personnel is very important with regard to production of high quality groundwood. The knowledge of the difficulties related to groundwood production should result in more attention being paid to groundwood personnel than has been given in the past. The production of high quality groundwood requires that the mechanical equipment be suited to the quality of the wood available and a high degree of knowledge and on-the-job training of the personnel is necessary so that the equipment may be used with optimum results. If sufficient grinder capacity is installed so that the operation of the groundwood mill is not dictated by maximum production pressure alone, the on-the-job training of groundwood mill personnel requires continuous attention in order to assure the production of optimum quality groundwood.

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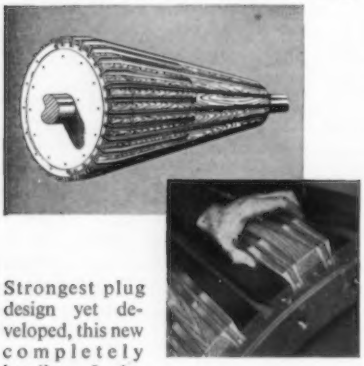

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Alvin H. Johnson & Co.

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PAPER MILL DESIGN PROCESS ENGINEERING POWER PLANTS

STRUCTURAL AND ARCHITECTURAL DESIGN

REPORTS APPRAISALS ESTIMATES AND SURVEYS

NEWS OF SUPPLIERS

C. J. Da Costa

T. E. Noon

R. E. Jacobs

S. N. Salomon

J. R. Williams

A. J. Link

A. Pearson

M. L. Fagin

Signode Steel Strapping Co. recently named six new regional managers (former district managers) and eleven new district managers to head the newly created regions.

At the same time a Sales Management Board was created to bring a larger group into planning and programming Sales Division activity, and to coordinate supervision of the field sales force.

Under the new plan the domestic sales field organization will be divided into eight regions, each directed by a regional manager. The regions are further divided into districts, each directed by a district manager.

The new regional managers, who were promoted from their former positions of district managers are: C. J. Da Costa, Cleveland Region; R. E. Jacobs, St. Louis Region; T. E. Noon, Boston Region; Almer Pearson, New York Region; S. N. Salomon, Pittsburgh Region; J. R. Williams, Chicago Region.

These together with A. J. Link and M. L. Fagin, who had previously been appointed regional managers of the San Francisco and Cincinnati Regions respectively, complete the division of the Signode sales organization into eight regions.

The newly appointed district managers, promoted from their former positions of assistant district managers, are: H. E. Edwards, Milwaukee District; R. F. Quady, Minneapolis District; R. E. Lenhard, Indianapolis District; S. R. Tucker, New Orleans District; J. M. Collins, Kansas City District; R. B. Deacon, Memphis District; H. A. Teigen, San Francisco District; E. T. McFate, Buffalo District.

The three additional district managers who have been promoted from their former positions of sales representatives are: C. A. Carter, Portland District; T. J. O'Donnell, New York District; J. J. Daniels, Newark District.

The Sales Management Board will be composed of the eight regional managers together with six members of the headquarters sales staff, including J. M. Moon, M. C. Carlson, J. F. Beckman, S. E. Heymann, A. N. Perry, and R. E. Frase.

Wallace & Tiernan Inc. has elected Dr. F. Vissers Hooft, R. T. Browning, P. E. Sharts and M. T. Tiernan to its board of directors, increasing the board from 10 to 14 members.

Allis-Chalmers Manufacturing Co. has assigned James A. Gerard and Richard J. Rashilla as sales representatives to the Chicago and Dayton offices, respectively, of its Industries Group.

John M. Gray has been assigned to the Southeast Region of Allis-Chalmers Industries Group as a serviceman.

William N. Caldwell, who had been a serviceman in the company's Southeast Region, has been assigned to the Tampa district office as a sales representative.

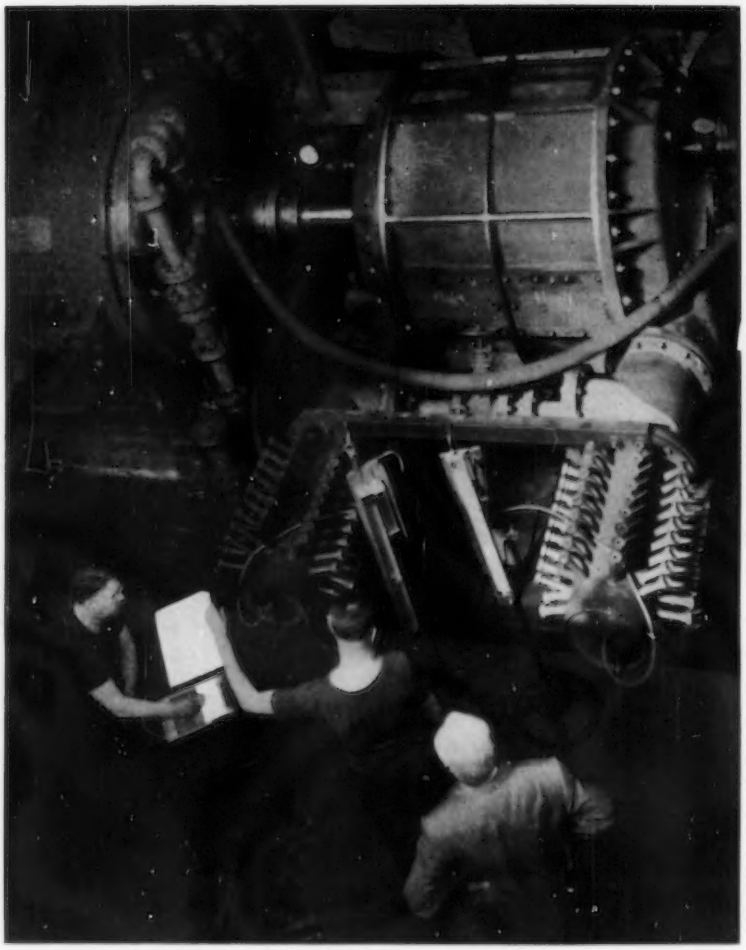
Robert E. Oliver has been assigned to the engineering section of Allis-Chalmers electrical application department.

Pedro H. Burgos has been assigned to the New York office of Allis-

Like They Wore 'em in 1858

1958 is centennial year for the Sandy Hill Iron and Brass Works, Hudson Falls, N. Y., and these employees are encouraging beards as part of the celebration. Winner will go to TAPPI convention and tour customers' plants. Selection will be made at Sandy Hill's annual employee-management dinner January 11.

Rated performance of every Nash Vacuum Pump is assured by this precise laboratory test



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NASH ENGINEERING COMPANY

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Chalmers International. A 1948 electrical engineering graduate of State Technical University, Santiago, Chile, Mr. Burgos was formerly associated with Metropolitan Vickers Electrical Co., Manchester, England.

O. W. Carpenter W. C. Messinger

G. H. Woodland E. M. Rhodes

Chain Belt Co. has elected O. W. Carpenter, formerly vice president, Construction Machinery and Finance, to be executive vice president, with direct responsibility for current operations of the company.

Three new vice presidents have been elected: W. C. Messinger, as vice president—Construction Machinery Section, has been promoted from manager, construction machinery division, Milwaukee. In addition, he now has executive responsibility for General Road Machines Division, Niles and Newton Falls, Ohio; the Burmeister Division, Milwaukee, and Chain Belt's California plant operation.

E. M. Rhodes, as vice president—Industrial Equipment Section, has previously been manager of this section. He has executive responsibility for the five Industrial Divisions comprising the Industrial Equipment Section. These are the Chain & Transmission Division and Conveyor & Process Equipment Div., Milwaukee; Roller Chain Div., Springfield & Worcester, Mass.; Shafer Bearing Div., Downers Grove, Ill.; and the Agricultural Chain Division, Dolton, Ill.

G. H. Woodland, as vice president—Marketing, is advanced from general sales manager—Industrial Equipment Section. He will be responsible for the Field Force, Sales Policy, Marketing Methods and Distribution of the products of the Industrial Equipment Section.

Newly elected officers at Southworth Machine Co. are John W. Jackson, George F. Thurber Jr., Stuart W. Tisdale and H. Theodore Hawkes.

Black-Clawson Co. has moved its Eastern sales office to a different address in Downingtown, Pa. The new quarters are at 31 Manor Ave.; the telephone number remains the same: Andrews 9-0500. This office is headquarters for Emerson N. Glauner Sr., representing Black-Clawson's Paper Machine Division, and for L. Paul Ellison and Jack Forbes of the Shartle Division Sales Department.

Foster Wheeler Corp. has moved its New York offices to 666 Fifth Ave., New York 19, N. Y. The telephone number is Judson 2-6600.

Southworth Machine Co. has announced the election of the following as officers for this Portland, Maine, manufacturer of graphic arts and materials handling equipment:

President, Stuart W. Tisdale; vice presidents, George F. Thurber Jr. and H. Theodore Hawkes; secretary, Robert D. Brace; treasurer, John W. Jackson. In addition, Thomas S. Dyer was appointed production manager, and Gordon Braun, shop superintendent.

A. M. Meincke & Son Inc. have announced that the purchase of the plant and business of Haberland Manufacturing Co. by Morningstar, Nicol, Inc., will not change the relationship that has existed for many years between this plant and A. M. Meincke & Son Inc., Chicago, Ill.

Products sold under the trade names of Paperine, Tufjel, Flexgum and W-100 will continue to be manufactured in the plant by Morningstar, Nicol, Inc. according to the specifications of, and for sale exclusively by A. M. Meincke & Son Inc.

H. L. Ryer

W. E. Greene Corp., New York City, has hired Henry L. Ryer as sales engineer. He will be responsible for sales and technical service in the Hudson River Valley area of New York State for lodding doctors and for rubber-covered rolls manufactured by Stowe-Woodward, Inc.

Previously he was purchasing agent of Scott Paper Co., Everett, Wash.

SEE THIS NEW FILM IN YOUR OWN OFFICE . . . Shows Pulpwood Feeder, infeed chain conveyor with hold-down for 4' and 5'3" Pulpwood, 21" Cambio Barker, Outfeed Conveyor with same hold-down. Write for film — 16mm.

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Pulpwood Barker

has now undergone rugged tests in various installations throughout the nation on 4' as well as 8' wood. Experience from improvements, specifically on the debarking tools and heavier gears, has now proven the Cambio Barker to work satisfactorily even in sub-zero temperatures. A new automatic bark cutter is also an improvement over earlier models.

You can use the CAMBIO Barker for EITHER pulpwood or sawlogs.

* Reg. U. S. Pat. Off. Numbers— 2,623,558 2,738,996 2,775,274 2,785,715 2,786,499 2,787,384 2,788,034

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1958 — Lockwood's Directory — 1958

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PULP AND PAPER MILLS UNITED STATES AND CANADA

Comprehensive reports including name of Company, Officers and Operating Executives.
Location of mills shown in geographic order. Mills identified to show whether Paper—Ground Wood—Sulphite Pulp—Sulphate Pulp—Soda Pulp—Semi-Chemical Pulp, etc.
Products manufactured. Total production in pounds per twenty-four hours.
Types of mill equipment and kind of power used.
Shipping point, railroad siding, post office, nearest bank, money order and telegraph office. Bus lines. Airport. Telephone. Highways. U. S. and State route numbers. In Canada: Kings and Provincial route numbers.

State and Provincial Maps keyed to indicate number of Pulp and Paper Mills in each City or Town.

MILL OFFICIALS—

An alphabetical list of the names of officers and operating executives of the mills including their connections.

LISTS OF NEW AND IDLE MILLS

CLASSIFIED SECTION

In this section are shown in alphabetical order the products made by all of the Pulp and Paper mills in the United States and Canada.

CITY ADDRESSES

In this section are shown the names and street addresses of Pulp and Paper Mills and Mill Agents maintaining offices in the principal cities of the United States and Canada.

Reports of the Paper and Pulp Mills in Latin America and Philippine Islands.

PULP AND PAPER MILLS AND CONVERTERS EQUIPMENT AND SUPPLIES

A classified section showing machinery, equipment and supplies purchased by the pulp and paper mills and the converters of paper products, with names and addresses of the manufacturers. An alphabetical list of Leading Trade Names with names of owners.

CONVERTERS

Manufacturers of products made from paper, card board, moulded pulp, etc. This section is geographically arranged by States and reported as follows: Name of company. Location of plant. Name of officers and operating executives. Types of mill equipment. Kind of products made.

CONVERTERS' PRODUCTS

Alphabetically classified including the names and addresses of concerns manufacturing products made from paper, card board, moulded pulp, etc., such as bags, boxes, cups, envelopes, glazed and coated paper and board specialties, papeteries, prepared roofing, tablets, pads, tags, toilet paper, towels, vegetable parchment, wall paper, waxed paper, etc., etc.

GENERAL PAPER MERCHANTS

Geographically arranged by States. Keyed to show dealers who maintain stores. Dealers who sell from mill direct. Merchants who sell from storage or warehouses. Merchants in other lines who carry paper as a side line. Concerns that are branches of houses located elsewhere. Fine Paper. Coarse Paper. Broker.

PAPER EXPORTERS AND IMPORTERS

Geographically arranged by States.

RAGS AND PAPER STOCK DEALERS

A selected list in geographic order of dealers in Rags, Paper Stock, etc. Keyed to show stocks handled. Importers are indicated.

RAGS AND PAPER STOCK CONSUMED

Kind and grade of Rags and Paper Stock Consumed by the mills in the United States and Canada. List of Purchasing Agents.

PULP TESTERS

Approved by certified pulp tester's bureau.

STATISTICAL TABLE

Showing number of concerns owning mills, together with the number of Pulp and Paper Mills in the United States and Canada.

TRADE ASSOCIATIONS

In the paper and allied trades of the United States and Canada.

WATERMARKS AND BRANDS

Alphabetical list of watermarks and brands used in the American paper trade with names and addresses of owners.

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NEW LITERATURE

GOLDEN-ANDERSON CUSHIONED FLOAT VALVE. (Bulletin W-5) Explains the features of this valve which has been designed for either cold or hot water service in the quick opening or throttling design with integral or remote pilot control. **Golden-Anderson Valve Specialty Co.**, 1228 Ridge Ave., Pittsburgh 33, Pa.

MODEL 77 FLOW COLORIMETER. (Bulletin 4000) Gives descriptions and specifications for the standard and new, improved ratio recording flow colorimeter. Also includes photographs and detailed drawings. **Beckman/Process Instruments Div.**, Fullerton, Calif.

1958 GUIDE FOR DOW CORNING SILICONES. (16p. Catalogue 1-113) Covers over 150 of their commercially available silicone products. Also includes charts, tables, graphs and data on properties and performance. **DOW CORNING CORP.**, Midland, Mich.

RHOPLEX RESINS FOR SATURATION AND BEATER ADDITION. (Bulletin) Gives information on paper saturation, beater addition methods, and the bonding of synthetic fiber papers to produce higher tensile strength and superior edge tear. **Rhom & Haas Co.**, Washington Sq., Philadelphia 5, Pa.

ROVALVE AIR AND LOW PRESSURE HYDRAULIC CYLINDERS. (Catalogue) Describes their "pre-tested" line of heavy duty cylinders. **W. G. Rovang & Associates, Inc., Dept. PT**, 1945 N. Columbia Blvd., Portland 17, Ore.

RELIANCE TOTALLY-PROTECTED A.C. MOTORS. (Bulletin B-2506) Explains Total Protection and its importance to motor performance by photos, drawings, and terse, easy-to-read copy. **Reliance Electric & Engineering Co.**, 24701 Euclid Ave., Cleveland 17, Ohio.

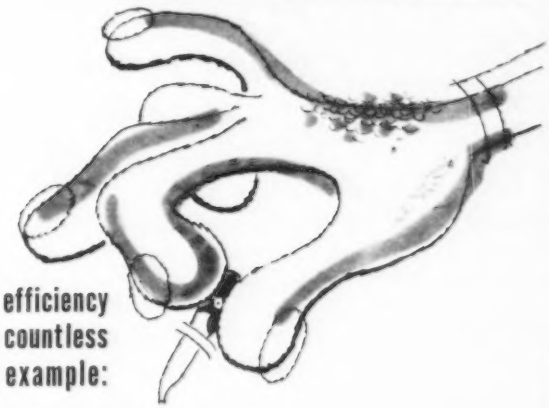
SPROUT-WALDRON 36-2 REFINER. (Bulletin 96-B) Provides detailed design and construction data on this model which has been precision engineered for pulping applications where rubbing and brushing (without cutting) is required. **Sprout, Waldron & Co., Inc.**, 130 Logan St., Munch, Pa.

THE AMERICAN PIPER. (Brochure) Interspersed with numerous illustrations of personnel, products, plants, installations, etc. this commemorates the company's fiftieth anniversary. **American Pipe & Construction Co.**, P.O. Box 1898, Portland 11, Ore.

TOWMOTOR FORK LIFT TRUCKS. (4p Folder) Describes in interesting detail the many outstanding design, construction and operating features contained in Model 460. **Towmotor Corp.**, 1226 E. 152nd St., Cleveland 10, Ohio.

UNICENTRIC FLEXIBLE COUPLINGS. (Bulletin UD 5801) Contains illustrated sales copy on their new line of heavy duty speed reducers and load supporting type flexible couplings. **H. W. North Co.**, Erie, Pa.

DOW CORNING SILICONE DEFOAMERS



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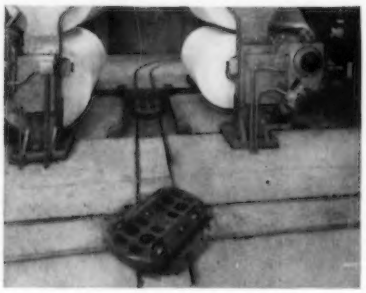

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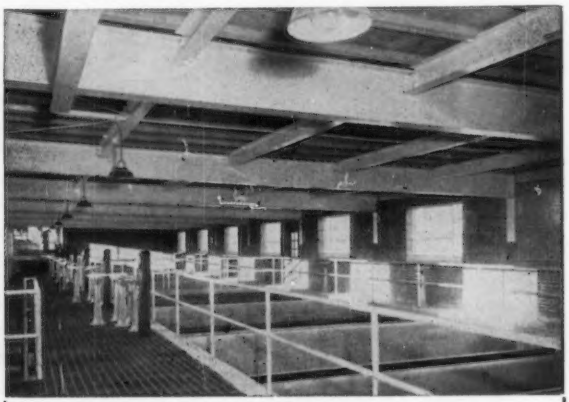

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D-30

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D-23

Situations Wanted

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To further develop our pulp exports we seek a young Scandinavian experienced in overseas trade. For one who has the ability to do creative and independent work the position has interesting possibilities. Experience from the U.S.A. or U.K. an advantage but no prerequisite. Station: Stockholm. Terms according to qualifications.

Applications should be addressed to:

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Nilson & Co. Ltd. AB
Arsenalsgatan 4
Stockholm, Sweden

Or:

Board of Directors
Anth. B. Nilson & Co. Ltd. A/S
Radhusgaten 27
Oslo, Norway

D-23

ELECTRICAL ENGINEER—Wisconsin paper manufacturer has an opening for an electrical engineer with some experience in layout work. The man we are looking for will have a sound grasp of the technical aspects of electrical engineering as well as a year or more experience in an industrial situation. He should be familiar with plant electrical requirements, power and control equipment and wiring, both A. C. and D. C. and electronics. Salary based on individual ability with opportunity for financial advancement. In addition, we have a profit sharing retirement program and the company assumes the cost of complete insurance coverage. Your replies will be held in confidence. Write: FORT HOWARD PAPER COMPANY, GREEN BAY, WISCONSIN. D-30

TECHNICAL DIRECTOR

Are you capable of organizing a research and development program which would offer the unique opportunities of following your technical developments from the laboratory and pilot machine stage through to full scale production runs? A well established and progressive New Hampshire firm manufacturing industrial fibre and fibre-resin type boards, is launching such a program. Familiarity with cylinder machine operation and fibre-resin production desirable. Send complete resume of education and experience to Box 57-348 care Paper Trade Journal.

D-23

COLOR-MATCHER

Prominent dyestuff manufacturer requires services of a qualified color matcher in the PAPER laboratory, New York City area. Knowledge of paper making not required. High degree of color sense and previous matching experience necessary.

Reply stating experience, education and salary required, to Manager, Paper Dept., Sandoz, Inc., Box 57-329, Paper Trade Journal. D-30

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IMMEDIATE DELIVERY

1—66" Holyoke 9-Roll Super Calender Stack, Complete. Rebuilt and used but a short time, in A-1 condition. Drives and Spare Rolls.
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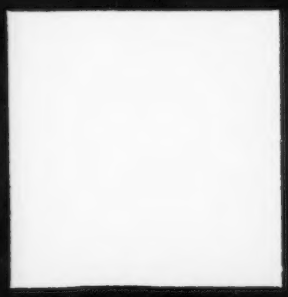

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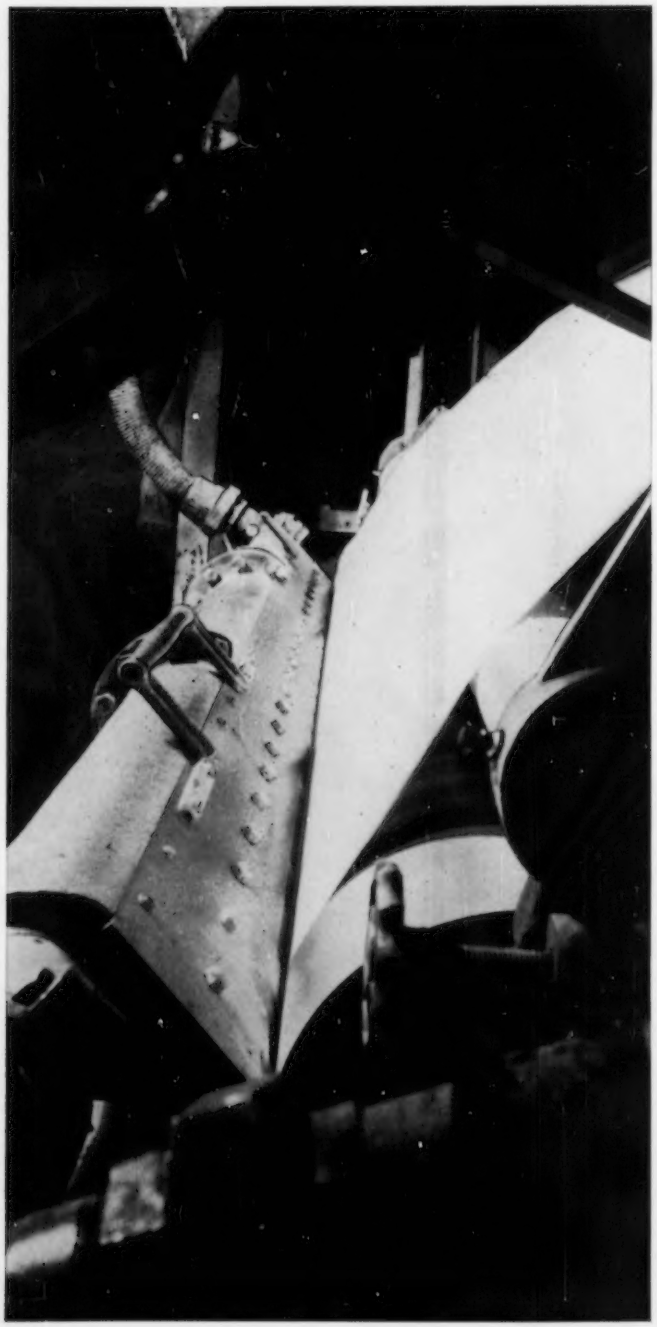

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